Products finishing

FRED W. VOGEL, Editor

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Products Finishing

A NEW department to be known as the Contract Distribution Division has recently been created in Washington under the direction of Floyd B. Odlum composed of expert industrial planners whose task it is to list every type and kind of manufacturing plant with the idea of analyzing defense jobs and placing contracts direct with the smaller plants or parts which will later be sent to larger plants for assembly.

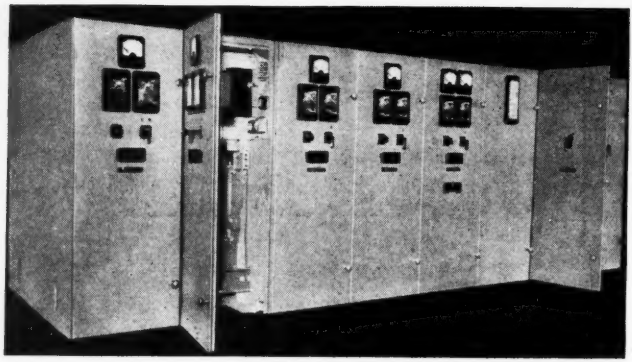
This idea was developed more than 15 years ago with the idea if and when "M" day should arrive, the ordnance department could immediately allot orders to every manufacturer whose plant was capable of producing even one item of war materials. But machinery wears out and is replaced by new machines and machines are sold and plant and departments are moved about all of which necessitated a continuous government inventory on practically every manufacturing plant in the United States, and this of course was not maintained. Now the time has come when we need all this information and so a new department has been set up for this purpose. It is being set up one year later than it should have been but nevertheless it will unquestionably prove its value.

The Contract Distribution Division will make possible the distributon of a greater volume of war orders and it will make possible the maintenance of plant organization in every plant capable of producing items of war materials.

TO make sure that no qualified manufacturer, no matter where he is, misses an opportunity to get a defense contract for lack of information, officers of the Army, Navy, Maritime Commission, and the OPM will tour the country beginning November 10 in three special exhibit trains. The specials will carry exhibits consisting of samples of defense equipment and parts needed by the services to give prospective defense manufacturers a clear idea as to the types of articles needed. The exhibits will be supplemented by blueprints and specifications.

The specials will leave Washington simultaneously on Monday, November 10, and be on the road a little more than a month. One will travel the eastern seaboard, the second will swing through the middlewest, and the third will go to the west coast and return via the south. Officials estimate that 30,000 small manufacturers would be interviewed aboard the trains during stops of a day or more in many cities where complete information and exhibits are not normally available.

Officials aboard the trains will endeavor to determine what type of defense equipment manufacturers are capable of producing and guide those with suitable equipment either to defense contractors who have work to let under subcontracts or to the proper government procurement offices. In some instances the train staffs will initiate negotiations which, carried through at regular field offices of the services, will result in contracts. Manufacturers may obtain admission to the trains by writing to the nearest field offices of the OPM Contract Distribution Division and, if they have not already done so, supplying detailed information regarding equipment of their factories.



A completely finished switch gear unit.

Steel and Its Finish Determines the "Eye Appeal" of Switchgear

By R. PAXTON

Assistant to the Manager
Philadelphia Works, General Electric Company

METAL-ENCLOSED designs for all switchgear equipment have made the selection of steel and its finish one of paramount importance, both to the manufacturer and the customer. Eye appeal of an enduring quality must be built into the equipment. For this reason, considerable research on base metals, finishes, drying methods, and related factors has been conducted by the company. Out of this investigation have come methods of sheet-metal work-

Fig. 1—The cold rolled sheet steel is coated with a rust preventing oil coating prior to cutting and forming.

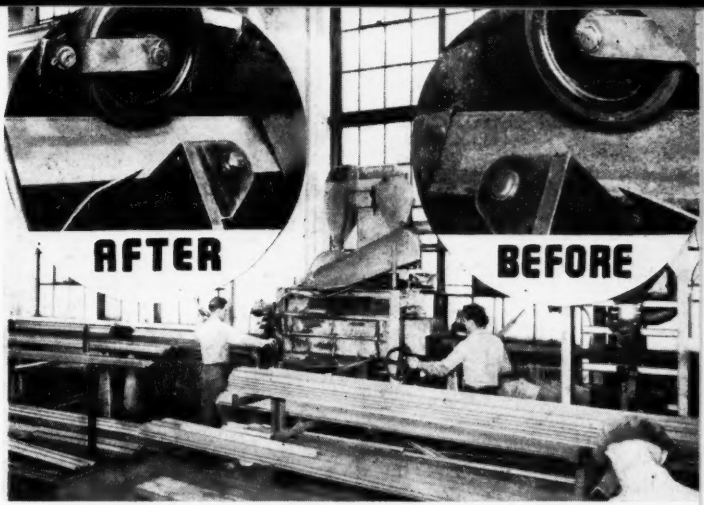


Fig. 2—This illustration shows the unit in which the structural steel members of switchgear cabinets are shot blasted to remove scale. The inserts show the condition of the steel before it passes into the cleaning unit and as it leaves the unit.

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ing and finishing which we believe provide everything to be desired as far as appearance and durability are concerned.

The following specifications, recommended generally for our switchgear equipment, outline briefly the application of these methods to the product:

The sheet steel shall be specifically smooth, level, and free from scale. The structural steel shapes shall be grit-basted to remove all surface scale. The surfaces of all steel members used in the construction of the switching structure shall be thoroughly and adequately cleaned of all grease, rust, scale, dirt, or other foreign material to form a satisfactory bonding surface for paint finish. The finish shall consist of priming, filling, and finish coats; the finish coat preferably to be of the fast air-drying lacquer to prevent the collection of dust during the finishing process and to permit any necessary refinishing after installation.

Summed up, these specifications require, first, the selection of top-quality basic materials and, second, the application of scientific treatment and finishes.

The sheet steel used for switch-

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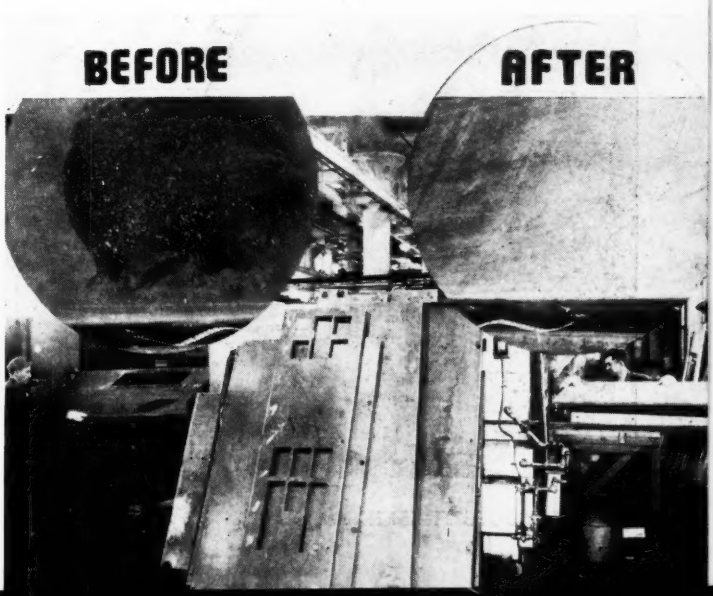

Fig. 3—The rust preventing oil coating on the fabricated panels is removed in a vapor degreasing unit. The condition of a panel section before and after cleaning is shown in the inserts.

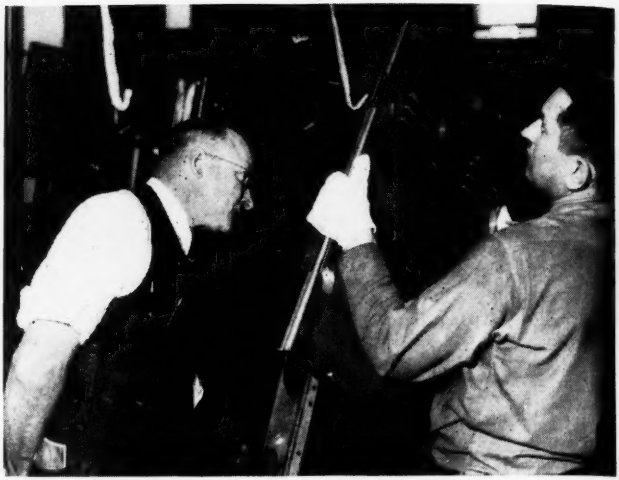

Fig. 4—The degreased panels are placed on an overhead monorail conveyor by the operator shown here, and conveyed to the paint spraying department. Each piece is carefully examined by the inspector.

gear panels, doors, and plates is a special grade of hot rolled, extra smooth, free-from-scale sheet. It is given an extra cold-rolled pass, followed by a rust-preventing oil coating. A view of the oil coated panels before fabrication can be seen in Fig. 1.

Structural shape steel members, such as angles and channels used for major supports and stiffeners are passed through a grit-blasting machine when they come from the mill, to remove all scale before fabrication. Fig. 2 shows a view of unit in which the structural steel members are descaled, and also inserts showing the surface condition of the steel.

Various shearing, punching, bending, and welding processes are employed to prepare the sheets and structural members for assembly into housings for various types of switchgear. Before assembly, however, the parts are given a thorough cleaning so that all surfaces will assure positive paint adhesion. This is ac-

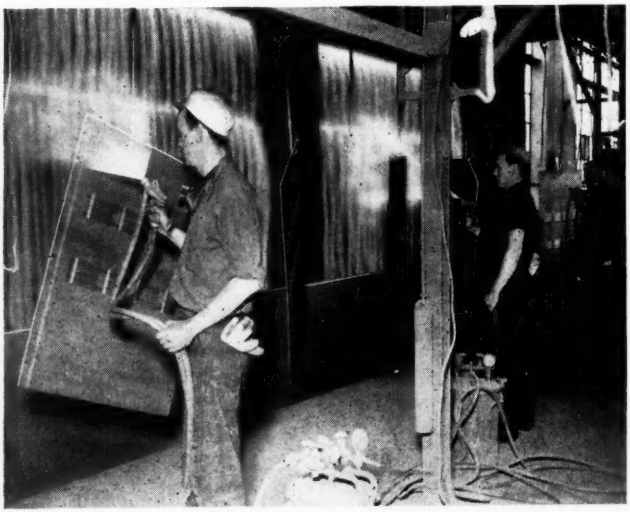

Fig. 5—The base and finishing coats are sprayed on the panels by the operators shown here. Overspray is carried into the water wash curtain which is located directly behind the workpieces.

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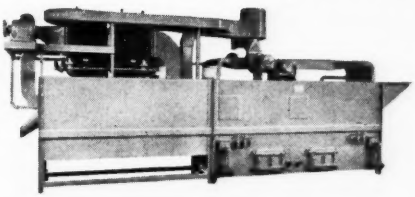

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complished chemically by passing the fabricated parts through a hot-vapor machine, or "vapor degreaser." The vapor degreasing unit is shown in Fig. 3. Rust preventing oil and drawing compound must be removed in order to provide a clean surface on which to apply coatings of finishing material.

Wearing clean canvas gloves, the operator shown in Fig. 4 removes the panels from the vapor degreaser and hangs them on the hooks of a monorail conveyor which passes an inspection station on its way to the finishing booths.

If the metal is satisfactorily clean, a coat of Glyptal resin base plus zinc-chromate is sprayed on at the priming station shown in Fig. 5. This mixture has proved its qualities of adhesion and rust-resistance under severe corrosive atmosphere conditions. It is light gray in color, and provides an unusually satisfactory base for further coatings of finishing material.

The finishing coats are of a Glyptal-nitrocellulose base which we have found provides exceptional durability. It has the further advantage of drying quickly into a smooth enamel surface. One coat is sprayed on immediately after the primer is dry. This coat is gray for the inside surfaces, completing their finish. The outside surfaces are given a metallic bronze coat. After final assembly of the switchgear as shown in Fig. 6, a final coat of Glyptal-nitrocellulose is applied to all outside surfaces, after they have been once more thoroughly cleaned with a chemical solvent.

The instruments and bright metal parts are masked as shown in Fig. 7, and surface filler is applied and smoothed down. The final coat is sprayed on just before the equipment is made ready for delivery, thus assuring that it leaves the factory in spic-and-span condition. Through the careful selection of equipment which is designed to adequately perform the

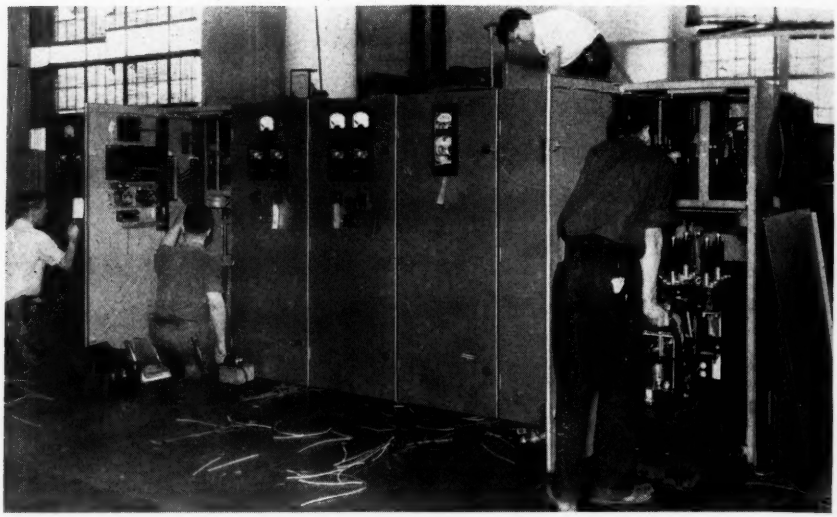

Fig. 6—Switchgear instruments are installed in the equipment cabinets before a final coating of finishing material is applied.

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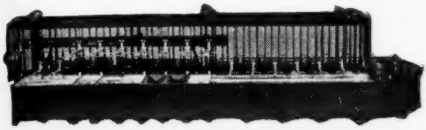

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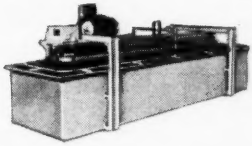

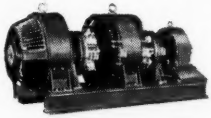

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Fig. 7—All exposed instruments and bright metal parts are masked by the workmen shown in this illustration. A final coating of finishing material is applied and permitted to air dry. When thoroughly dry, the masking tape is removed and the switchgear cabinet and equipment is ready for delivery.

desired finishing operation in minimum time and at a reasonable cost, a smoothly coordinated finishing department has been the result.

The Design of Manufacturing Enterprises. By Walter Rautenstrauch. Published by Pitnam Publishing Corp., 2 W. 45th St., New York, N. Y. 298 pages. Cloth binding, board covers. Price, $3.50.

Profitable operation of large and small manufacturing businesses is dependent on their efficient economic design. "The Design of Manufacturing Enterprises" makes available the principles and methods of the economics of manufacture.

Rational methods of design that improve operating characteristics are helpfully presented through clear discussions and examples chosen from well-known businesses. Tables, chart, full layouts, and other essential data are extensively used. Most of the examples are taken from the author's broad, practical experience in designing new businesses, redesigning parts of existing businesses, and redesigning entire businesses to put them on a profitable basis. The first part of the book deals with business as a whole, the second, with selected problems.

A thoroughly experienced instructor and industrial engineer, Mr. Rautenstrauch discusses authoritatively and concisely the design of products; design of methods of manufacture and the selection of machinery and equipment; plant layouts; design of the organizations for manufacture and for marketing and the methods of their management and control; design of the organization of the business as a whole for integration of production, marketing, and finance; design of the capital structure; design of the investment structure. Examples are given from both the process and mechanical industries.

Carson Electronic Micrometer. The Model L Carson Electronic Micrometer which is said to measure paint film thickness accurately to 0.0001 in. is described in a bulletin now being issued by Instrument Specialties Company, Inc., 233 Bergen Blvd., Little Falls, New Jersey.

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And when this period of unusual stress is past, the skill and competence acquired during 139 years of Du Pont chemical research will still be available to assist you in readjusting your program to normal requirements.

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Porcelain Enameling with A Radiation-Type Pyrometer

By W. A. BARROWS

President, The Barrows Enameling Company
Cincinnati, Ohio

THE past year has seen many of our production problems multiplied tremendously. This has been due to increased business, the loss of our old experienced help and the fast turnover of even our inexperienced help.

This extremely interesting article was presented as a talk before the sixth annual Forum of the Porcelain Enamel Institute at Ohio State University, Columbus, Ohio, October 10, 1941.

In general, little difficulty is experienced in breaking in brushers, spray hands and most other operators with the exception of the burners. Here our company ran into an almost insurmountable snag. Our job shop operations call for short runs of a great variety of ware and the burning requirements are much more severe than those of the ordinary production-type shop.

In analyzing the requirements we find that a burner is supposed to set his time clock making due allowances for five variable factors: (1) temperature of furnace; (2) gage and shape of ware; (3) weight of tools; (4) temperature of tools and (5) type of enamel. A man on the furnace for a year can make a good stab at these compensations but a man of a few months' experience is helplessly sunk. Of course, the experienced burners also have a bad day or two now and then when they turn out considerable imperfect ware.

It might be well here to visualize the fishscale, copperheads, off color panels, reboil, warping and all the other familiar consequences of bad burning that cause enamel shop operators and owners to lose sleep.

Our own particular headache seemed to center mostly around warping. In trying to work out some solution on this problem we approached The American Rolling Mill Company. The ARMCO men brought

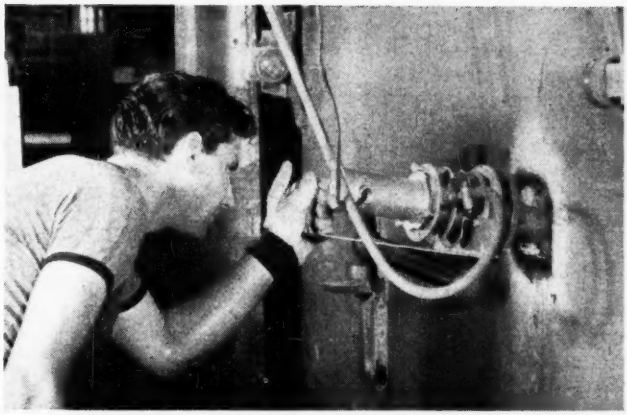

Fig. 1 — A closeup view showing a burner focusing the radiation head of the pyrometer instrument on workpieces located within the furnace.

with them some very interesting laboratory studies on deformation of enameling iron at different temperatures. These reports indicated very clearly that the base iron sags very slightly at 1450 deg. and increases gradually in amount of sag up to 1630 to 1640 deg. Then it reaches a critical point and loses strength at an amazingly fast rate. These experiments were made under laboratory conditions and indicated that temperatures of 1640 to 1650 deg. simply could not be exceeded if ware was to be produced free of distortion. As ordinary enameling practice calls for a furnace temperature around 1580 deg. for ground coat, the laboratory test **seemed** to have no particular application to our problem.

Another study made by the ARMCO laboratory did appear to have a little more immediate bearing. This was a study of the time factor on the sagging of iron. The study indicated that in an accurately controlled temperature iron will sag at a fast rate the first few minutes and at a decelerating rate up to 20 minutes and then will continue to sag at a slow rate up through 30, 40, 50 and 60 minutes. These ARMCO studies, plus our own shop experience, indicated very definitely that accurate control of burning is important.

In an effort to follow the problem still further, we asked many technical men in the industry two questions: (1) What is the temperature of a properly fired piece of ware? and (2) Does firing time effect the maturing of enamel or is it simply a means of arriving at the proper maturing temperature?

Definite furnace temperatures and definite times were agreed upon but no one we talked with knew what the temperature of the ware would be under these conditions. On the second question, it was unanimously agreed that time and furnace temperature within certain limits had little to do with the matter of proper burning; that at a certain temperature of the ware the enamel matured and that was that.

The obvious solution then was to base our burning on the temperature of the ware instead of on the temperature of the furnace.

Our furnace is controlled to a line by the usual recording controlling pyrometer with thermocouple in the rear of the furnace. This device is a great help as it relieves the burners of all furnace adjustments, but due to lag it does not keep the atmospheric temperature at an exact level and compensations in burning time have always been necessary.

To test the theory of burning on

ware temperature we, with some bit of difficulty, attempted to pull heats at a predetermined ware temperature with an optical pyrometer. We found that this could be done and that the temperature of the ware could vary as much as 25 deg. plus or minus and still be classed as satisfactory. What was more important, our best burner could not consistently hold within this wide range on the great variety of ware handled in job shop operations. Therefore the obvious solution was to obtain a satisfactory and practical instrument to tell the burner when the ware had reached the proper maturing temperature regardless of the five variable factors previously mentioned and regardless of time.

Two types of instruments would do this job: optical pyrometers and radiation type pyrometers. Through experimentation, the radiation type pyrometer proved satisfactory for our particular installation.

As radiation type pyrometers have not been in general use in the enameling industry it may be well to give a brief explanation of this instrument. We all know that heat rays can be focused with a lense because as boys we used to focus the sun's rays with a magnifying glass to scorch wood or ignite a piece of paper. And we all are familiar with the standard pyrometer operated by measuring the minute electrical current generated when a bi-metallic thermocouple is placed in a hot atmosphere.

The radiation type pyrometer con-

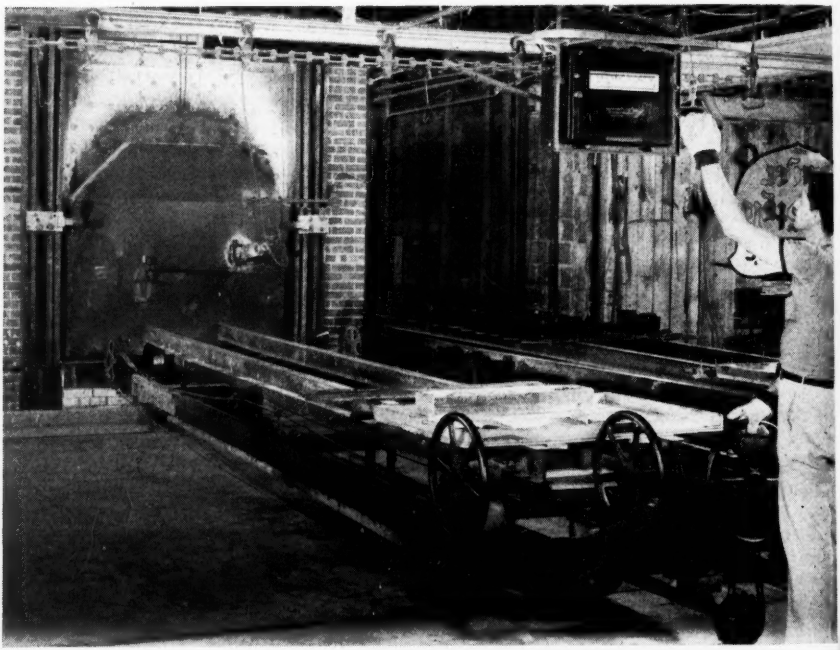

Fig. 2—A general view of the firing furnace showing the location of the radiation type pyrometer in the furnace door and also the heat indicating instrument which is located in front of the burner.

THE INSIDE STORY ON THE G-E "500"

Page 9 from the New G-E Booklet
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sists of a lens which concentrates the heat rays given off by any hot body onto a group of small thermocouples connected in series. The current generated by this group of thermocouples (called a thermopile) is measured and translated to degrees in a standard pyrometer. The group of thermocouples connected in series is used in order to increase the electrical energy to a measurable amount. These instruments have been on the market five or six years and are used to measure the temperature of steel in a strip mill, molten metal, moving parts in continuous heat treating furnaces and a great variety of similar installations.

In attempting to locate a satisfactory make of radiation type pyrometer to use on a porcelain enamel furnace this rather unusual list of requirements was drawn up:

1. The radiation head must be located in the furnace door to avoid remodeling of the furnace.

2. The head must be compact so as not to interfere with hanging rack tools or loading of the fork.

3. The tube must not extend into the furnace more than the thickness of the door.

4. The head must withstand normal vibration of moving and seating of the door.

5. The head must withstand relatively high ambiant (or surrounding) temperatures and these temperatures must not affect the accuracy of the instrument.

6. The head must be mounted on a swivel so that it can readily be focused on ware in various parts of the furnace.

7. The focusing beam must be confined to a spread of but a few inches at six to eight feet so that it can be trained on a small sized piece.

8. The radiation head must be equipped with sighting devices so the operator can be sure it is focused on a piece of ware thus obviating false

With mass production of the new "standard" cemented carbide tools at Carboloy Co., Inc., new production methods have speeded output. Here, a tray of such tools is being finish sand-blasted in an enclosed booth to clean up all surfaces prior to coloring the shanks. After sand-blasting tools designed for cutting of steels are dipped in "copper" paint, while "aluminum" coloring is used for tools designed for cutting cast iron, brass, and so on.

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readings through inclusion of furnace walls or burning tools.

9. Temperatures must not be affected by objects outside of the focus area, such as the walls of the furnace.

10. The pyrometer must actuate a signaling device.

11. The control setting must be quickly adjustable by the operator without opening the instrument.

12. Cost.

The leading instrument companies were presented with these requirements and after due deliberation it was decided that the Brown Instrument Company could meet all specifications with their "Radiamatic" and the necessary instrument was ordered.

One other factor entered the calculations and that was the effect of various colors of ware on the readings. All radiation pyrometers are apparently calibrated on black bodies and without compensation a false reading would be given on ware other than black. This feature was not important in our case because we were not interested in actual temperatures but in the proper maturing point of the ware. And as long as all white ware was matured at the same and correct temperature, and all black (or ground coat) ware was matured at the correct temperature, the practice would be successful. In addition, it appeared that the variation caused by difference in color of the ware would be so small as to be well within a practical working range.

Results of actual use of the radiation pyrometer have been extremely gratifying. We rather expected to spend several days checking and switching over from the old time temperature method to the ware-temperature method of burning control. However, after the first check on each type of ware the cover coat, ground coat and a few special enamels, our time clock has not been touched. And what is more important, not one load of improperly fired ware has been seen in our shop since the change.

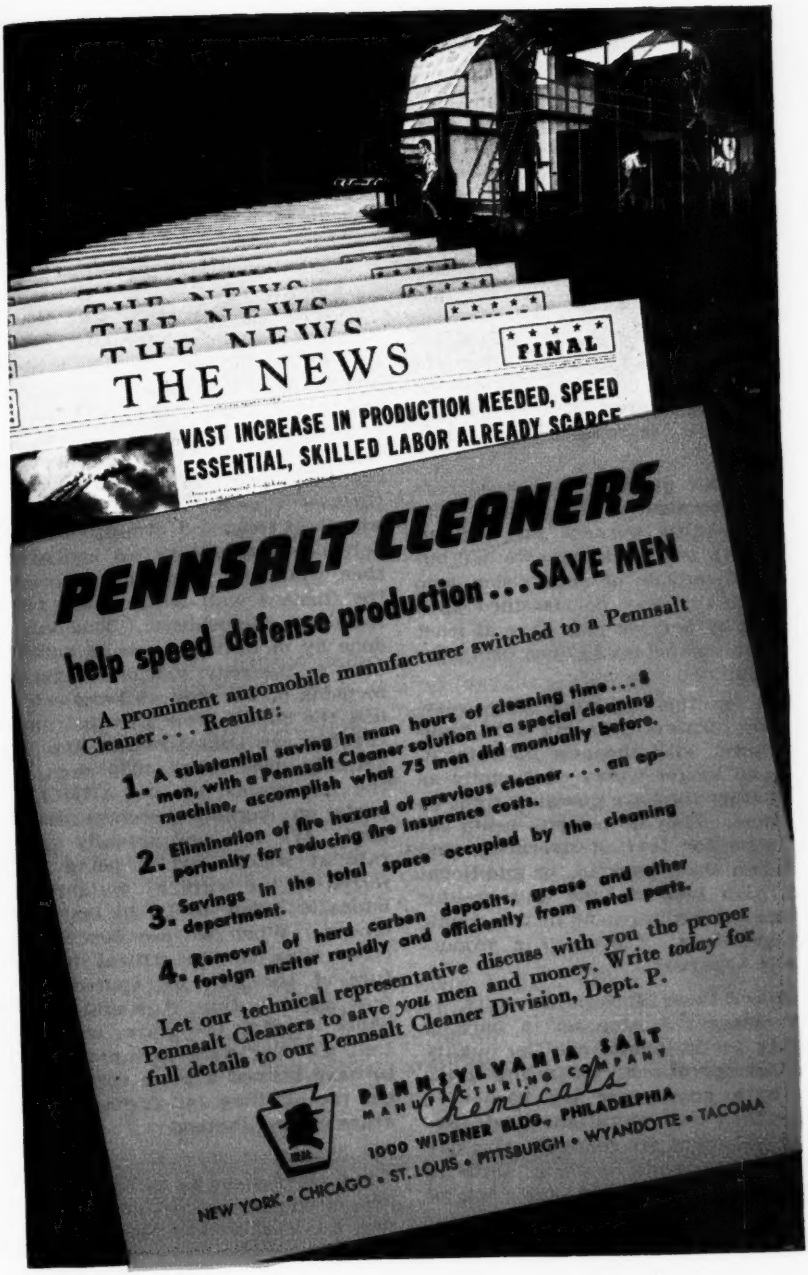
The pyrometer is marked with the following table:

Ground coat .....1630 deg.
Zurcinium white .....1575 deg.
Colors and black.....1550 deg.

The burners simply set the pyrometer at the proper temperature, run the load into the furnace, walk to the radiation head on the furnace door and aim at any convenient piece of ware. Atmospheric temperatures are not considered unless some delay has caused the furnace to get completely out of the usual burning ranges. When the alarm bell rings the ware is done—without question.

Our operators no longer consider the time factor in pulling heats. But this does not mean that time can be entirely ignored, or that ware can be fired in an amazingly short time to step up production. We assume that time must be held within the usual range in order to have uniform absorption of heat in the ware and to allow for proper oxidation of the iron in burning ground coat. A control procedure has been set up in our shop to check the burning time several times a day to be sure that it is falling within reasonable limits. These limits are controlled by proper adjustment of atmospheric temperature through our automatic furnace control.

It is needless to mention the affects of the procedure on quality. The ARMCO men feel that all distortion of metal may be eliminated except such as may be caused by fabrication or design of the part. The oxide manufacturers feel that since practically all variations in color are due to temperature variations, the major part of their troubles will be eliminated. Ground coats can be more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closely adjusted to metal and to individual shop conditions through closer control of burning.

Our shop does practically no cast iron work. It seems probable that this new type of burning control may prove even more useful with cast iron ware than on sheet ware. We now feel that we may be burning a great variety of job shop ware in a box furnace with as good control and uniformity as can be obtained in the present continuous furnaces. But the instrument surely can be applied to continuous furnaces also. Here the radiation head could be focused on the passing ware and the furnace temperature controlled directly from the ware.

Our labor problem on the burners is licked because we do not need technically skilled burners any longer. Whereas a few weeks ago we had but one man outside of supervision who could in any way be classified as a finished burner, we now have at least five men competent to burn using the new system.

The reaction of labor may vary, but our furnace operators were highly pleased with the new instrument. They no longer worry continually as to whether they are guessing right on the time. They do not pull heats out too soon for fear of overfiring and then run them back in for additional fire, with loss of time and greater chance of misjudgment in the double fire operation. A step-up in production is apparent.

Beyond these immediate results, we find others. A step up in burning quality tends to increase the quality of other operations. Operators working with good ware try harder to make their own operations good. Rejects and reops are reduced. Our day and night floor foremen used to spend as much as 75 per cent of their time in checking burning operations. They claim this time now is nearly reduced to zero.

Getting back to the technical point of view. Recall that the ARMCO tests show that iron distorts rapidly at 1640 deg. and over. Our furnace is still controlled to an atmospheric temperature of 1580 deg. for ground coat. Yet we fire the ware at 1630 deg. in ground coat according to our radiation pyrometer. It seems quite evident that radiation from the furnace walls supplies most of the heat absorbed by the ware and that it must be absorbed at a different rate and degree in the ware than in the conventional type thermocouple. Also, the thermocouple being located in the colder back wall of the furnace does not indicate true heat. Radiated heat from the side walls and floor of the furnace appears to be the prime source of heat and atmospheric temperature is secondary. A logical step then would be to accurately control the furnace wall temperature rather than the atmosphere. This can be done by mounting a second radiation head in the rear wall of the furnace focusing on the side wall and controlling the burner from this instrument.

When we consider that the ware actually does reach 1630 deg., then the importance of the ARMCO reports on sagging becomes self-evident. We can now actually see the rate at which heat is being transferred to the ware by watching the indicator jump 10 to 15 deg. every second. When we see how dangerously close to the critical temperature of the iron we approach, and how short a time it would take to badly overfire the ware, we marvel that we ever were fortunate enough to have burned a piece correctly under the old time and furnace temperature control method.

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Barrel Finishing of

Continuing the Research Discussion On the Use of Lignum Vitae

By H. LEROY BEAVER

Barrel Finishing Consultant
Lansdale, Pennsylvania

IN the discussion on barrel finishing applications as contained in the October Issue, we dwelt principally on a discussion of a new material whose application in barrel finishing procedure had been very spotty, if at all, and just what characteristics that material possessed to fit it for barrel finishing use.

So much has been both said and written with respect to the use of any kind of wood material in barrel finishing procedure, and especially so with reference to what are known as the "sappy" or "gummy" woods, such as pine, and whose exudation of pitch or tar so-called is detrimental to the best barrel finishing results, that any mention of the use of a material containing a resin of any sort almost immediately prompts raised eyebrows and expressions of bewilderment. Of course, the major part of the comment previously made, not only by the author of this series, but by other commentators on barrel finishing procedure was with reference to such woods as pine, reduced to sawdust form and used for drying out parts after rinsing following the barrel finishing operation. We still disapprove of the use of such material in just that manner for the reason that in all dry finishing operations there is set up a definite amount of frictional resistance that raises the temperature of the entire burnishing mass so that such saps or gums are sweated from the wood itself and adhere to the parts being finished, sometimes proving very difficult to remove in subsequent operations.

Lignum Vitae sawdust—so called—and the method of its use as developed in this research is quite a different matter from the use of sawdust of any kind in drying out operations. Where incorporated gums are a detriment in other applications, in this instance at least we can safely transform the gum percentage into a very definite asset.

In the previous paper we discussed the wood itself, its hardness and general characteristics. Now we will discuss the same material but reduced to what would be generally termed a "sawdust" form. Here we might explain that supplies of sawdust from this material as acquired in general manufacturing procedure are more or less meagre, and it is at times necessary to break down the material. This can be done, provided the pieces are

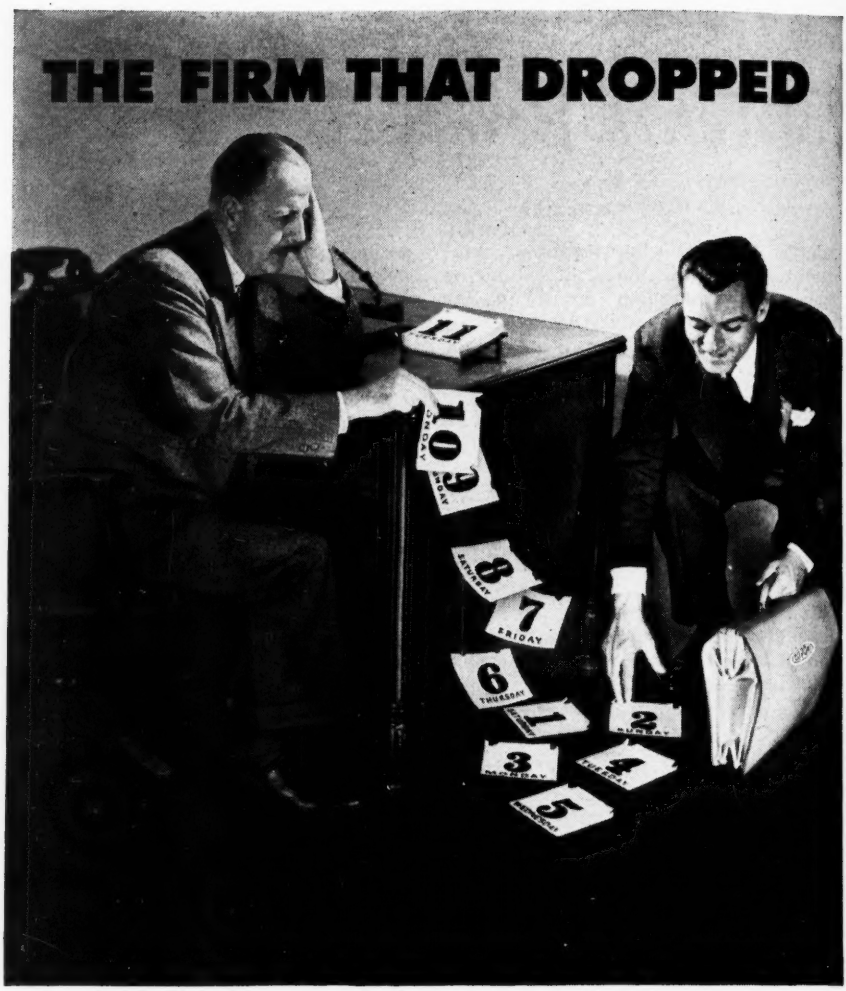
not too large in a conventional hammer mill, but the material cannot be successfully handled in what are called mills of the attrition type.

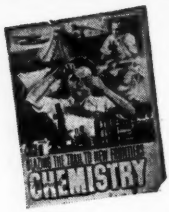
In common with many other fibrous materials, while lignum vitae has no distinct grain cleavage line, it will not break into cubic form as might be supposed, but follows the break up line of say for instance all of the cereal grasses or fibrous stem materials in that it tends to break up into the form of what are termed "needles." That is to say that the small particles will tend to be elongated and fine in cross section rather than blunt and of short section, and this is true even if the screen used is comparatively coarse.

Inasmuch as we have previously described, there is a distinct difference in character between the outer sapwood of the tree itself and the inner or what is termed the "heartwood," there is a necessity for separating the two kinds and use only the heartwood for the procedure covered by this research. This is not a practicable operation prior to crushing or grinding and so the method as previously described has proven the best we have developed for separation of the two characters of wood comprising the trunk mass.

We have previously commented on the very distinct variation in specific gravity of lignum vitae as compared with all other woods, and the importance of the utilization of its added weight and extreme hardness and toughness for barrel finishing application. Let us suppose that the barrel load for a given operation would be one level bushel of material. When maple, ash, beech, and some of the other woods are used we must not forget that the average weight of the standard bulk quantities of this material, that is, four bushel lots would

Fig. 1 — Illustration showing a selection of lignum vitae parts.





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be but 96 pounds. With lignum vitae this load ratio increases to such an extent that an equal volume of the material reduced to sawdust form, i.e. four bushels will weigh from 268 to 270 pounds.

It will thus be seen that in bulk alone while the quantity would be the same, when the weight factor is examined the lignum vitae will be found to be at least three times the bulk of the previously applied wood materials, and this figure is taken from readings from first crushings and before the sapwood was removed, so that, if the two are separated and the ratio applied to the heartwood only, then the variation in weight will be even greater by almost one-third. It is surprising how much actual difference there is in operating time cycles when the heavier material is used. Its toughness tends to long wear and it is very slow in powdering as are most woods used in barrel finishing procedure.

Let us suppose that by whatever method used we now have the crushed or milled lignum vitae before us in a form that would be best understood if it were to be designated as "sawdust." Fully 26 per cent of this material consists of a gum known commercially as gum guiac which is a tough tenacious resin insoluble in water and for which reason the material may be used either wet or dry.

The problem as to how best to utilize this larger gum content of the material has required intermittent study of the problem for upwards of three years in which time several hundred experiments were conducted using all manner of materials and combinations of materials in an effort to discover the best method of treating the material for barrel finishing use. Inasmuch as the melting or exudation point of this gum ranged from 184 to 197 F., one of the problems was how this heat could best be applied without literally scorching the gum rendering it useless for the procedure we had in mind.

This was finally solved by the use of infra red bulbs of 250 watt capacity with polished copper reflectors and by inserting a rod thermostatic control into the barrel (oblique tilting type) to intermittently turn on and off the current until the revolving mass reached its proper temperature. This degree of temperature varies somewhat so that it is necessary to depend to a large extent on a visual examination of the material when in process to determine just when the next step is to be taken.

The material when first started will be dull and lifeless, but as the heat rises, it will tend to take on a somewhat wet or glossy appearance until it reaches a point where small balls will begin to form which indicates that sufficient gum has sweated to the surface of the material. It is at this point that we add the necessary and proper amount of abrasive material that we later propose to use in the metal or plastics finishing procedure. This is a somewhat critical factor because too much abrasive will not adhere and too little will impair the effectiveness of the product.

The heat is withdrawn immediately after the abrasive is added, but the mass must be kept in continuous operation until the gum guiac has reached a complete and final "set," after which it can be removed from the treating barrel and after aging for at least 24 hours is ready for production application.

Due to the fact that many very fine particles will be found in the material as crushed or hammer milled, and to the fact that the dust that arises from the material in operation would be dangerous, the reader is cautioned not to attempt to work on this material with any manner of open flame in the immediate vicinity,

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and extreme care must be used to prevent any degree of scorching. While we made several attempts to treat this material in jacketed barrels, the results were not so satisfactory as the infra red method which we finally adopted for the material.

The importance of this material will more readily be recognized when we compare it with the wide range of materials now used in some dry finishing processes, and more particularly in cases of attempted copying of patented processes. The most generally accepted method has been to take ordinary sawdust and then compound a combination of fats, oils and waxes to form a binding material which is then incorporated with the wood material where it acts as a binder to hold in suspension any abrasive or polishing materials it is wished to utilize in the respective operations of deburring, cutting down or final polishing operations.

Such binders require continuous renewal and unless they can be maintained in what would be termed a "tacky" condition the abrasive very soon filters off and rides the periphery of the barrel for the reason that the abrasive itself is heavier than the wood particles and must sink to the bottom of the mass.

With lignum vitae prepared as indicated, there is no abrasive loss, because the temperatures developed in dry finishing will run upwards to at least 109 degrees F. and this degree of heat will tend to keep the gum guiac coating just slightly softened so that it does not present definite scratch marks as would appear were hard glue binder to be used, and the degree of tenacity even at this temperature is such that as the abrasive is scuffed off the particles it is readily picked up again so that even in fine screen sifting very little free abrasive is found.

Now the question—how long will this material last, or in other words, what is its life as compared with other wood mass that is or could be used? Well, the answer very simply is that there will be less than 1/10 the loss from powdering as is experienced with other woods. Then too, we must remember that with a gum content of a full 26 per cent that not all or even a small part can be sweated to the surface and used in a single operation, so that, the material can be heated and re-heated until it loses up to 25 per cent in bulk, or until added heat will not bring a recognized wet or shiny surface on the material in preparation for the addition of the abrasive or polishing material. It thus constitutes a material that can be used over and over again without loss of its effectiveness.

The material as we have above described it is invariably used **dry.** One would think that once we had gone this far along the line that the research could be considered as complete and closed, but not so, because we discovered that in order to get the most effective final results, that rinsing was important and that a clean surface was an absolute necessity. This we had difficulty in securing, using the plain or ordinary coated material, and finally it was necessary to retrace many of the steps to develop a method and a material that would act as a solvent for the gum itself and that would have to be almost immediately effective when used after the finishing operation. This problem too was finally solved and the solvent for the gum guiac is added in its proper proportion along with the abrasive material so that when the parts are washed after the final barrel operation no trace of gum remains on the surface, even under magnification.

We do not now, nor have we ever in our 30 years of barrel finishing research, ever taken the liberty of assuming a thing to be a fact, but as

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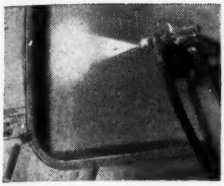

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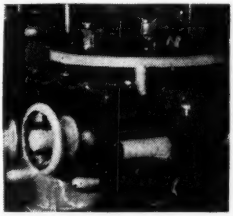

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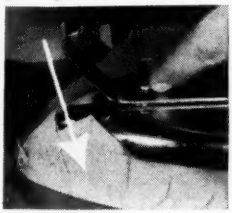

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we go along, each phase and each operation must definitely prove itself to be both mechanically possible as well as commercially practicable, before any announcement is made.

Before closing this discussion we believe it might be pertinent to comment on another application phase of this material, treated as above. Barrel scouring is one form of barrel finishing procedure on which we have touched very little in the course of the past five years, and yet it, like many other yet undiscussed phases is of very definite value in many finishing programs. Lignum vitae due to its extreme hardness and toughness lends itself admirably to barrel scouring operations. We have previously noted that gum guiac is not soluble in clear water, and for that reason when treated as described it may be used either wet or dry.

For wet scouring, the barrel is loaded in the customary manner but instead of hard steel burnishing materials, soft annealed materials should be used. Just one half the quantity of water is added as that used in barrel finishing with soap solution for polish or burnish finish. Equal parts or steel material and treated lignum vitae sawdust are used, that is if you use four pecks of steel materials use the same amount of treated lignum vitae. This mass should be wet but the water should not reach the surface of the mass so that the sawdust will thoroughly incorporate in the mass. By this procedure most satisfactory scouring results are easily secured, and the material can be used over and over as a binder and carrier for the abrasives used in the process.

(The discussion of the use of lignum vitae as described, is not intended as directions for use of the material. The entire research was conducted for and is a part of the Lupomatic Patented Barrel Finishing Process, and has been described as a matter of interest and to indicate the continuous improvements being made in barrel finishing procedure generally.—HLB.)

Industrial Washing Machines and Conveyors. A folder telling how seven famous companies solved their product washing problems is now being issued by The Alvey-Ferguson Company, 75 Disney St., Cincinnati, Ohio.

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B. F. Goodrich Vibro - Insulators. Stripped of highly technical descriptions of the problem of isolating vibration in machines, The B. F. Goodrich Company, Akron, Ohio, has recently published a 12-page catalog section on its Vibro-Insulators, the devices of metal and rubber which have found wide acceptance in combatting the vibration and noise problem.

Excellently illustrated, both with actual installation pictures and engineer's drawings of each type of Vibro-Insulator which it manufactures, the catalog section gives all the pertinent information on each.

The first two pages are filled with a general discussion of the vibration insulation problem and the part that rubber is playing in its solution. Methods of selecting the proper Vibro - Insulator mounting are given, together with methods of mounting, and discussions of uniformity of load distribution, rocking and horizontal motion and the care of the devices.

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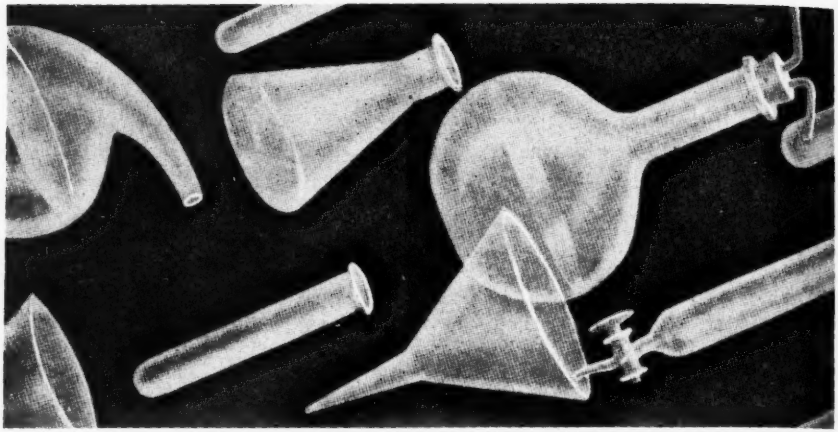

Finishing Research Laboratories and the Defense Program

INTUITIVE insight, insatiable curiosity, and dogged determination—these are the words one writer has used to describe the research scientists who have contributed so much to the comfort and security of the American people. The years of painstaking effort that went into the cotton gin, the telephone, the reaper and the electric light, followed eventually in each case by the marking up of another great advance in living standards and satisfactions, have made the names and achievements of Eli Whitney, Alexander Graham Bell, Cyrus McCormick, and Thomas A. Edison familiar to millions throughout the world.

Today, these same qualities are as much a part of the equipment of our industrial and university chemists, physicists, metallurgists, and other researchers, as they were fifty or a hundred years ago. Intuitive insight, insatiable curiosity, and dogged determination have written the history also of the airplane, automobile, radio, and camera, of rubber, chemicals, alloys, and plastics.

However, there is one difference between research today and that of even twenty-five or thirty years ago. That is its scope. In 1941, according to the Bureau of Foreign and Domestic Commerce of the United States Department of Commerce,

there are more than 70,000 research workers, working in some 2,200 laboratories, the number of workers being more than double what it was in 1927.

Research on this present scale calls for a high degree of organization and co-ordination of work, since no one individual can hope to acquire a mastery of all the problems of even a single industry. For that reason, the results of modern laboratory work are seldom evident in one great advance that revolutionizes the industry, but consist rather of constant, step-by-step improvement in products, making them either more useful or less expensive.

The work of the Oakite Research Laboratories presents an excellent example of this co-ordination of work and steady progress year after year. The activities of this laboratory organization extend into practically every industry in the country, and naturally have had to be departmentalized, and to an extent that might surprise the casual observer who is unaware how widely varied are the cleaning problems of the various industries. One division of the research organization specializes, for example, in metal cleaning, others in the cleaning and related problems of railroads, automotive and air transportation, dairies, bakeries, packing plants. Still another division devotes itself to the development of new technical equipment for use by the more than one hundred Oakite representatives in the field.

Thoroughly Tested Before Being Released

Most often, of course, the result of the work is a logical development

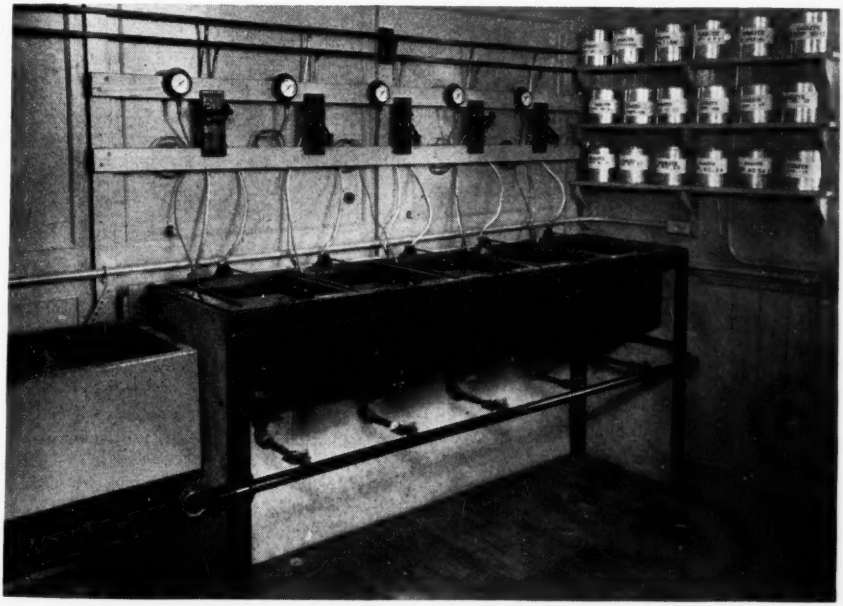

Fig. 1—Closeup view of rectifier unit and battery of pyrex glass plating tanks. Instant adjustments of voltage and amperage is provided by highly sensitive controls.

bearing specifically on the production problem for which it was intended, and becomes available to that industry as soon as thorough working tests have established its value for that work. All these divisions, however, deal with some phase of cleaning, and occasionally an idea is developed, and gradually brought to maturity in one section of the laboratories, and then is found to be even more useful to another section.

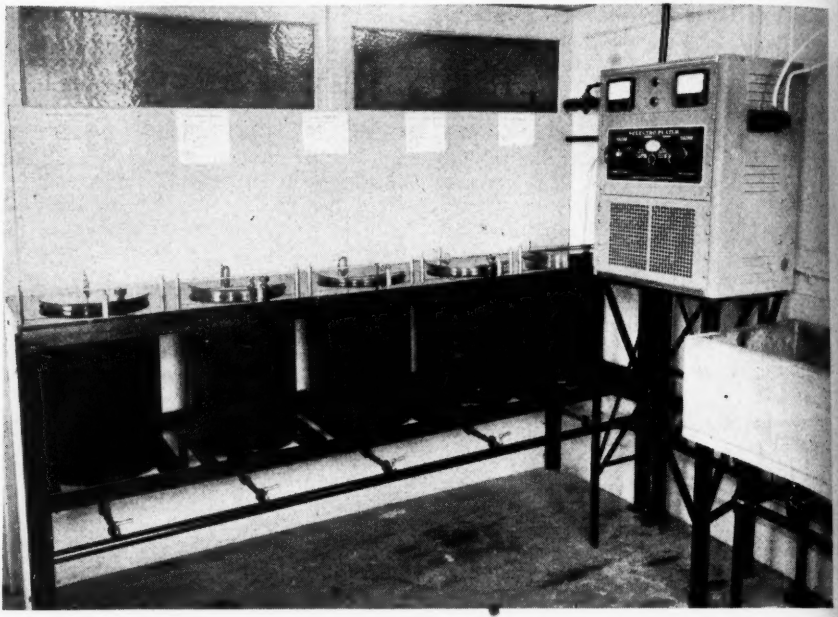

Fig. 2—Five welded steel cleaning tanks, each wired for either direct or reverse current, and each equipped with a double-throw switch. Rinse and spray tanks are located at the right.

Metal Plating Research Aids All Metal Cleaning

At the present time, the defense program with its call for all-out production in fabrications of all sizes, shapes, and kinds, has focused special attention on metals research, and an important part of this has to do with those operations relating to the preparation of metals for plating. Cleaning before plating is a highly important subject of research in itself, but added to its own importance is the fact that success in finding answers to problems incidental to this type of work frequently means success in many other types of metal cleaning, where thorough cleaning of the base metal is essential in preparing it for subsequent operations.

Thorough-going familiarity with the new alloys, both ferrous and nonferrous, familiarity with the modern deep-drawing and fast-cutting practices, and familiarity with the more intricate shapes produced today that are more difficult to clean, give Oakite research men and field representatives a "head start" in serving metal fabricators.

The foundation of this knowledge

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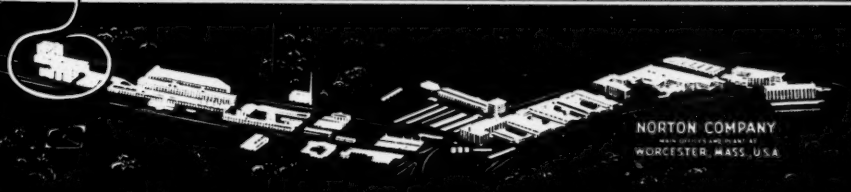
these steps are greatly increasing the productive capacity of that part of the Norton Worcester plant where Alundum abrasive for polishing is processed and packed after it comes from the Norton electric furnace plant.

Thus Norton is meeting the increasing demands of the defense industries for abrasives for polishing — and polishing is a vital operation in the production of airplane and tank motors, guns and many other products vital to defense.

G-130

NORTON ABRASIVES



is the carefully compiled past experience of the company, and the calibre of the men who are doing the actual research work. Far from unplating tanks. With this equipment, comparative tests of cleaning problems and materials can be conducted to determine such properties as opti-

Fig. 3—Another view of the metals section of the laboratory, showing a buffing wheel at the left, and in the corner an electric control panel used with the beakers illustrated, for small-scale tests.

important, however, is the physical laboratory equipment without which the necessary research could not be carried on. The Oakite metal plating laboratory provides, on a pilot-plant scale, the most modern equipment for control of all variables, such as composition of solution, control of temperature of solution, proper current density, "upkeep" or additions to maintain strength of solution, timing of cycles, soil loading, and life of cleaning solution.

Actual production conditions in metal-fabricating and metal-plating plants can be reproduced in the laboratory by means of such equipment as the spray-type metal-washing machine, buffing machines, a group of welded steel solution-tanks, running water tank and shower sprays for rinsing, rectifiers, and a number of mum working temperature and concentration, tolerance to grease contamination, loss of volatile constituents, and efficiency in removal of specific soils, either when the cleaning solution is new or after it has been in use for various periods of time.

Tanks Equipped With Double Throw Switches

Each solution-tank is provided with gas burners, an Oakite Heat-Clean meter for temperature indication, and electrical connections. Independent double-throw switches make it possible to use each tank as a soak tank or for either anodic or cathodic cleaning. An outstanding piece of electrical equipment is the new type rectifier, which has been found to be ideal as a source of low-voltage current supply. This rectifier has a maximum

continuous current output of 150 amperes at any voltage from less than 1 volt up to 9 volts. It has a combined circuit-breaker and line switch, a 49-step voltage control, pilot lamp, ammeter, voltmeter and monitor system. This rectifier entirely eliminates the use of individual control panels on each tank as the current control can be adjusted on the control panel of the rectifier itself.

Scarcities Complicate Plating Work

The plating tanks are Pyrex cylinders, encased in steel drums and set in a table of welded angle-iron construction, surfaced with a half-inch layer of Bakelite. The drums are heated by gas. Anodic and cathodic contacts are made by means of brass studs, drilled, tapped and threaded for thumb screws connected to bus bars under the Bakelite table surface, so that no wires or bus bars are exposed on top of the table.

All types of plating solutions used by industry are held in these tanks. Most frequently employed are such formulas as bright nickel plating solutions, bright copper, Rochelle salt copper and chromium.

Any phase of plating research is important, but it is especially so today with the problems that have arisen in many plants, due to changed operating conditions and due to the scarcity of some of the metals which were formerly a part of the standard procedures used in many plating departments. With a completely equipped plating installation for handling the many service problems submitted to it, the Oakite Research Laboratories are well equipped to help industry not only find improved methods for the future, but to render immediate help on the unusual problems being created by operating conditions today.

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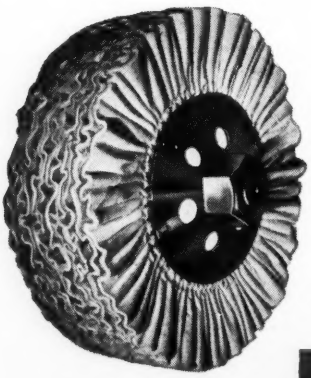

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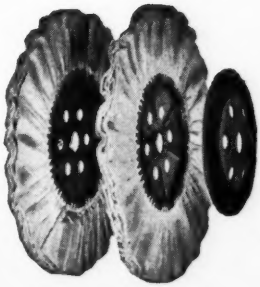

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Modern Gold Plating

By JOSEPH B. KUSHNER, CH.E.
Metal Finishing Consultant
New York City

THINGS are beginning to look pretty bad for the Novelty Jewelry Industry. Even as this is being written a committee from the New England Jewelry Manufacturers' Association has flown to Washington to ask for allowances of metal so that they may continue in business and the 35,000 men they employ kept off relief. The pinch is on for fair.

Even where the manufacturer has an ample supply of metal salted away, he is running into difficulties with chemicals. Practically every chemical you can think of is on the priorities list. Formaldehyde, for example, a fairly commonplace compound, ranks so high on the social register of defense that the only way you can get it—if you haven't an urgent priorities rating—is to knock on the iron grilled door three times and ask for Bill. The "Chem-Easy," like its prohibition namesake, the Speak-Easy, is beginning to flourish. By paying a price slightly steeper than the Washington Monument it is still possible to obtain the highly desirable but n o r m a l l y unavailable chemicals and metals.

While this is a dandy proposition for the chemical bootleggers, it isn't so good for the plater who buys the "just off the boat" stuff, in more ways than one. The reason we bring this up is that the squeeze on cyanide looks as though it is going to get much tighter. Cyanides are literally the life blood of the gold and silver plating industries, for without them there can be little or no plating of these two metals. The only things needed to plate gold are gold and cyanide, so it would seem a pity to have to stop plating it for the lack of cyanide. The question that confronts the gold plater then—and every other plater — as the shortages become worse and the priorities thicker, is what to do?

It appears as though the non-defense gold plater in search of cyanide will have the choice of four alternatives:

1. Get into paint and lacquer finishing. In other words, forget about gold plating.

2. Learn to skimp with and nurse along whatever cyanide can be gotten on the chemical bread line.

3. Do a catch as catch can with a chemical bootlegger, with no legal comeback against misrepresentation.

4. Plate gold from non-cyanide solutions containing l e s s essential chemicals.

Alternative number one cannot be very pleasing to the jewelry or nov-

Part 15

elty manufacturer who likes fine gold plated finishes. The appearance of a gold dye lacquer job is never equal to that of a genuine gold plated finish and always gives the impression of cheapness. Besides, with organic solvents already high in the lists of strategic chemicals, this alternative may be nothing more than a will-o'-the-wisp.

Choice number two is probably one of the best bets for the gold plater. At least for the while, it is still possible for the plater to get a small allotment of potassium or sodium cyanide. Even though this amount may be considerably smaller than what he has been accustomed to getting, he may by careful use and judicious handling, make a little go a long way. To this end we would like to give a few tips and pointers.

Conserving Cyanide

Potassium cyanide is a fairly stable compound under certain conditions, and under others, it is not. Just what are the conditions?

Potassium cyanide reacts with all acids, even the very weak ones to form hydrocyanic acid, a gas at room temperature or above and an acid salt. Typical reactions are those shown below. The first is with hydrochloric acid, the second with sulphuric and the third is with carbonic acid derived from an industrial atmosphere or water.

(1) $KCN + HCL = \text{gas } HCN + KCl$

(2) $2KCN + H_2SO_4 = \text{gas } 2HCN + K_2SO_4$

(3) $2KCN + H_2CO_3 = \text{gas } 2HCN + K_2CO_3$

From these equations we can immediately learn a cyanide saving lesson. **Do not keep an acid dip tank adjacent to a cyanide dip or the gold plating bath.** If they are too close together, there is always the possibility of accidentally spraying, dragging, or dripping in some of the acid into the cyanide, with consequent loss of cyanide. It will be noted that if the acid is dibasic, that is, has two hydrogen atoms, twice as much cyanide is lost. This points to the moral that, if the plating cycle is such that an acid dip is used before a cyanide solution, with an unavoidable, small, but nevertheless continual, drag-in, a hydrochloric acid dip should be used in preference to a sulphuric dip, if at all possible.

Use distilled water in making up a gold plating bath and in making replenishments. While in a number of communities tap water is eminently satisfactory for gold plating purposes under ordinary circumstances, it should not be used if there is any chlorine (due to water treatment) or carbon dioxide present, as both of these destroy small but nevertheless definite, quantities of cyanide. In this connection, it may even be advisable to use a standing distilled water rinse prior to entering the gold plating tank to cut down the negligible proportions the amount of chlorine dragged in from the city water rinsing operation.

Potassium cyanide tends to hydrolyze to form hydrocyanic acid and potassium hydroxide:

$KCN + H_2O = HCN + KOH$

This form of hydrolysis is quite slow at ordinary temperatures but it does occur to some extent and is therefore a source of cyanide loss. A second

type of hydrolysis which may occur under certain conditions, is this one:

$$KCN + 2H_2O = HCOOK + NH_3$$

in which cyanide is converted to formic acid or a formate (under alkaline conditions). Undoubtedly the most important decomposition reaction is the oxidation of cyanide to carbonate:

$$KCN + H_2O + KOH + \tfrac{1}{2}O_2 = K_2CO_3 + NH_3$$

Potassium hydroxide electrodically produced, combines with potassium cyanide in the presence of air and water to form carbonates and ammonia.

These three reactions are as inevitable as the inevitable death and taxes but it is possible to keep them from galloping along too rapidly by: (1) Using a minimum free cyanide concentration in the plating bath, (2) Keeping temperatures as low as possible, (3) Using retarders or negative catalysts.

(1) **Use a minimum concentration of free cyanide in the plating bath.** This rule follows from the logical chemical principle, that, if you have less of a reacting substance present, proportionately less of it will react; and thus, the sum total of cyanide destroyed will be less. This chemical principle is sometimes known as the law of mass action.

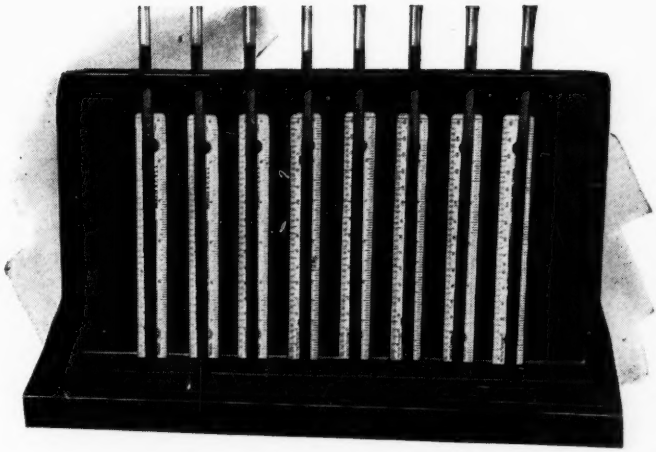
It is well known from actual experience that good results can be obtained from gold plating baths considerably lower in free cyanide concentration than is commonly recommended in the literature, but there is a tendency for the average gold plater to keep the free cyanide concentration a good way above the actual needs of the bath. This is generally due to rule-of-thumb methods used in control; therefore, now, more than ever, chemical control of the gold plating bath is called for, at least as far as free cyanide is concerned.

It will be found, for example, that gold plating baths high in phosphate ions work quite nicely with free cyanide concentrations as low as ¼ oz. per gallon, and less. It is far better to run the gold plating bath with the cyanide concentration as near this low level as possible by making use of a simple chemical free cyanide test than to consider this test a waste of time and waste precious cyanide instead. The writer in the course of his work has often come across gold plating baths with free cyanide concentrations of 5 oz. per gallon and more that could have worked much more efficiently with concentrations of ½ to 1 oz. per gallon.

In calculating the free cyanide, it should be remembered that 1 oz. of sodium cyanide is approximately equivalent to 1.3 oz. of potassium cyanide. This means that the plater who wishes to do so, may make an additional saving in cyanide by substituting sodium for potassium, but here, once more, the question of balancing plating advantages obtained by using potassium cyanide, over economy considerations, comes up again. See Part 3 of this series.

(2) **Keep the plating temperature as low as is compatible with good results.** This follows logically from the fact that most chemical reactions tend to increase in velocity as the temperature goes up. As a matter of fact, there is an approximate rule which states: "Many reactions are roughly doubled in rate by each 10 degree rise in temperature." This, of course, does not always hold true, but in the reactions given here increasing temperature does cause an increase in the speed of the reaction.

In all of them a volatile substance is generated (HCN or NH_3), and leaves the field of action more rapidly at a higher temperature, thus permit-



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ting the formation of more of the volatile substance. The accelerating effect of heat on these reactions has been proved by research performed at the Bureau of Mines and elsewhere.

The idea then, is to keep the temperature of the plating bath as low as possible. Ideally, a room temperature solution would be best but in practice it will be found difficult to operate a room temperature cyanide gold plating solution and still keep a good color. For the sake of the record, however, we wish to report that we have found platers who have claimed they could get good results from a room temperature cyanide gold plating solution—but we have never seen any in practical operation.

In salt water plating it is possible to get a fair color at room temperature but the rate of plating is so slow, the method must perforce be precluded from production work. Nicely colored gold deposits can be obtained at temperatures as low as 100 to 120 deg. F., and there is no reason why these temperatures cannot be used in preference to near boiling temperatures, so frequently found in uncontrolled commercial practice.

(3) **Use an oxidation retardent or negative catalyst.** This, while an excellent idea, is hard to put in practice because very little work has been done in the field of anti-oxidants for cyanide plating baths. Certain substances, when present even in small amounts, seem to possess the power of permitting ordinarily difficult or impossible reactions to take place rapidly without in any way being affected themselves. These are called catalysts. Other substances, when present in traces, seem to possess just the opposite effect, that is, they prevent or retard the chemical combination of compounds that would ordinarily make a wild dash for each other, if put together. These substances are named retardants or negative catalysts.

It is known, for example, that certain organic chemicals when present in the minutest traces, prevent and retard the oxidation of rubber. In the cyanide plating bath very little is known of what possible substances can be used to prevent the reactions previously described, from going to the right. Small amounts of sulfites seem to exert a benign effect in this direction. They tend to retard the reactions inasmuch as they are reducing agents, but they are not specific nor do they have a powerful effect. Some chemical research on this problem is urgently needed.

As a further suggestion for preserving the cyanide in the plating bath we recommend the **use of a cover for the gold plating tank.** The tank should be covered whenever it is not in use. This prevents acid laden dust from falling into it and keeps out the acid fumes that tend to settle over a plating shop at night when the windows are closed and the exhaust fans are not in operation.

Our final recommendation for nursing the cyanide content of the plating bath along is to **use a drag out recovery rinse tank,** the contents of which can be utilized in replenishing the plating bath. Such an expedient is always advisable in the interests of saving gold but now it is doubly so in the interests of saving cyanide—which literally speaking, may become harder to get than gold, in the near future. The recovery rinse tank should contain a fairly large volume of distilled water, at least half the volume of the gold plating solution proper, and care should be taken to rinse well, with sufficient time for drainage. See Part 8 of this series for further information on the subject.

The third alternative for the gold plater who finds it hard to get along with skimpy rations of cyanide, is to

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buy from sources which are still available, at whatever price one has to pay. Frankly, this is neither a patriotic or ethical thing to do, since, if the material sold is the real McCoy, it usually means that it has been surreptitiously withdrawn from defense uses.

During the first World War when we were cut off from the only commercial source of potassium cyanide, Germany, resort was had to its sister compound, sodium cyanide. Chemical bootleggers, knowing the preference of most platers for potassium cyanide in gold and silver plating, made a nice bit of change by selling to gullible platers, both here and in England, alleged potassium cyanide that was nothing more than sodium cyanide with a slight sprinkling of potassium cyanide and a not so slight sprinkling of cheaper, inert salts.

Present conditions, with World War number two raging, are somewhat different. Some time ago, a few large chemical concerns with their ears to the ground began manufacturing potassium cyanide in substantial amounts, of excellent quality and purity, equal to, if not better than that produced by Germany. But these salts may soon be gone with the O.P.M. leaving almost none for the poor non-defense novelty plater. This being the case, the make-a-quick-profit boys will begin to offer unsuspecting platers potassium cyanide of dubious lineage and quality.

If you are going to deal with a "Chem-Easy," remember the old Roman motto, "Caveat Emptor." Let the buyer beware! If an unfamiliar person comes to you and tells you he can get you lots of cyanide at a price, be careful. If it is a "bargain" price be twice as careful. Insist on being able to perform a few sample tests on the entire lot of material offered before you sign the check—this is only figurative—you pay cash on the line in these transactions. If the bootlegger does not permit you to do this, you'll be better off forgetting about the whole thing.

Here are a few simple and approximate tests that will help you check up on what you are getting and enable you to determine whether you are getting desirable potassium cyanide, its less desirable sister, sodium cyanide, or the poorer, worthless relations such as sodium carbonate.

If the powdered material—cyanide in egg form is a patented item and hard to produce so it's more likely to be genuine—is represented as being 95 per cent sodium cyanide, take a fair sample of the whole lot, mix well and weigh off .50 gram. Dissolve in 200 mls. of water, add a crystal of potassium iodide and titrate against standard .1 Normal silver nitrate, to the first faint turbidity. If the material is 95 per cent pure this should require close to 48.5 mls. of silver nitrate. A figure considerably less than this shows that the material has been adulterated with inert ingredients.

It is when you are offered white powder alleged to be pure potassium cyanide by these chemical scofflaws that you generally have to look out for a fast one. Here, all manner of tricks are possible. In the first case, the test described above, when made by itself, does not indicate anything significant. A .50 gram sample of 95 per cent potassium cyanide will react with 36.5 mls. of .1 normal silver nitrate, but by mixing a few parts of sodium cyanide with a little inert salt of approximately the r i g h t weight required to bring the whole mixture to the correct density, you get a white salt that looks like potassium cyanide and reacts with the proper amount of silver nitrate, but is definitely not KCN!

In a case like this, it helps a little to put a few of the powder crystals

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on a loop in a clean iron wire and hold them in an open blue gas flame. Potassium gives a distinct violet coloration to the flame and sodium an intense yellow. A small amount of sodium impurities may be present and these will give a yellowish tinge to the flame that masks off the violet of the potassium. If you look at the flame through a piece of blue glass however, you will see a strong violet color, if the stuff is really potassium.

Sometimes even this will not help since a fair amount of potassium salts may be mixed in. To make sure, weigh off .50 grams of the powder and dissolve in 200 mls. of water. Now add a saturated solution of barium nitrate until no further precipitation takes place. Filter off on close-pored paper and determine as sodium carbonate, it may also be, possibly, sodium sulphate. Add a crystal of potassium iodide to the filtrate and washings and titrate with .1 N silver nitrate. If the sample is 95 per cent potassium cyanide, 36.7 mls. of silver nitrate will be required and the weight of carbonate obtained will be less than .025 gram. If, however, the weight of carbonate or sulphate obtained is much greater than this, that is, runs around .1 gram it becomes obvious that the material could not be potassium cyanide alone but is either sodium cyanide or sodium cyanide plus some potassium cyanide.

Other tests, that tell how much there is of each, can be performed but these are too long winded and complicated for rapid use in a plating shop. If the plater has no balance or scale with which he can make a fairly accurate weighing and he is in doubt, the best thing to do is consult a chemist who will analyze it for him. Of course, if the lot to be purchased is small this will not pay and the plater will have to trust to lady luck.

The final possibility, using non-cyanide gold plating baths, is a subject that deserves a paper in itself and for this reason it will be discussed in the following installment.

"Individualized Inco Nickel Alloys." A twelve-page catalog giving individual characteristics, mechanical properties and application information on the Inco Nickel Alloys — Monel, "K" Monel, "KR" Monel, "S" Monel, "R" Monel, Nickel, "Z" Nickel and Inconel. Tables of physical constants and available forms are included. Copies are available upon request to International Nickel Company, Inc., 67 Wall Street, New York City, N. Y.

"Brown Air Operated Controllers for Temperature, Pressure, Flow, Liquid Level, Humidity" is the title of Catalog No. 8903 recently issued by The Brown Instrument Company, Wayne and Roberts Aves., Philadelphia, Pa. This 36-page catalog contains a wealth of information invaluable to the executive, engineer, and plant operating man. It will make an excellent and practical addition to any plant library.

The text is written in an easily read style. Important facts and descriptions of the various types of air operated controllers are clear and concise. It tells how, why, when, and where Brown Air Operated Controllers may be used in processing operations to obtain maximum efficiency.

Large, clear photographs of instruments and installations are featured throughout the catalog. Besides actual pictures of the interior and exterior views of the instruments as a whole, the important operating parts are pictured individually. Schematic diagrams show the principle of operation, "indexet" mechanism, non-bleed booster pilot, and so on. Also shown are photographs of the Brown Diaphragm Motor, Power Cylinder and accessories.

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Triton 720. A synthetic detergent called Triton 720 and described as "an aqueous paste of sulfonated ether salt" has been announced by Rohm & Haas Company, 222 W. Washington Sq., Philadelphia, Pa. It is said to be widely useful in the enameling and electroplating fields where its stability makes it suitable for either acid pickling baths or alkaline cleaning solutions.

In a book released by the manufacturers, Triton 720 is said to disperse scum that forms on the top of acid pickling tanks, thus increasing the life of the acid and eliminating faulty cleaning. When Triton 720 is added to the acid bath, a light foam forms on top of the tank and prevents disagreeable acid fumes from escaping.

In alkaline cleaning solutions, concentrations of Triton 720 ranging from 1/10 per cent to two per cent of the weight of the bath are recommended, and are said to remove greasy film from metal and prevent precipitation of metal salts on the surface of the parts.

Copy free upon request.

Conductivity Measurement and Control Instruments. To simplify the selection of the instrument best fitted for a given application, a condensed listing and price list of types and models is now being issued by Industrial Instruments, Inc., 156 Culver Ave., Jersey City, New Jersey.

The listings include the Solu-Bridge, Solu - Bridge Controller, conductivity bridge and cells, Mega-Bridge, Decade Capacitor, and distilled water checker. The concentration ranges or changes and other pertinent data are included for ready reference.

Copy free upon request.

Taylor Slide Comparators. Taylor Slide Comparators for pH, chlorine, and phosphate control, and also water analysis are described in a six-page folder which is now being issued by Platers Research Company, 59 E. 4th St., New York City.

A copy will be sent free to those who submit their request on their firm letterhead.

Did you know that . . .

Data on cleaning metal parts of all kinds will be forwarded to those who fill in the coupon on Page 8?

A complete line of electroplaters' equipment designed to meet the specific demands of defense work is available? See Page 15.

A new illustrated booklet on "Copper Oxide Rectifiers for Electroplating" is being issued upon receipt of the coupon carried on Page 21?

Those who visit the Exposition of Chemical Industries, Grand Central Palace, New York, December 1 to 6, will have an opportunity to see a graphic demonstration of a Duriron Pump converted to a Stainless Steel Pump? See Page 27.

Literature describing 22 items of metal finishing equipment and materials is being sent free upon request? See Page 86.

THE *Finishing* FORUM

Sulfated Fatty Alcohol in Metal Cleaning and Plating Baths

By J. B. CROWE
Procter & Gamble Company, Cincinnati, Ohio

THE increasing use of the sulfated fatty alcohol type of synthetic or soapless soaps in metal cleaning and plating has shown the use of this product to have a definite place in the cleaning and plating industry. Many plants have found its adoption in their processes to mean better, more thorough cleaning, better plating with fewer rejects because of improved cleaning, and increased efficiency and savings in the plating bath.

Many requests for information in regard to the composition and application of soapless soap in the finishing field have come to our attention and for clarity in our explanation we have selected Orvus as a representative product to discuss. The properties of Orvus which have made it such an efficient assistant in cleaning and plating are very interesting. It is called "soapless soap" because it possesses the good properties of soap but differs from it chemically in such a way as to overcome the normal

Do you have a metal finishing problem?

Through the cooperation of outstanding authorities in the fields of metal cleaning, plating, burnishing, lacquering, and so on, PRODUCTS FINISHING is prepared to aid you in the solution of your finishing problem. There is no charge for this service.

Also . . .

If there is a "kink" or short cut in use in your shop, send in a description of it. Each one published will be paid for.

handicaps of soap. Like soap, Orvus sudses, cleans, washes, wets out, lowers surface tension, penetrates, and so on.

Unlike soap, however, it is unaffected by hard water; whereas soap forms the well-known insoluble and sticky lime soap curds when used in hard water. Whereas soap is broken down by acid and is effective only in alkaline solution, Orvus is stable and effective in acid, alkaline, or neutral solutions. Whereas soap forms insoluble curds with most metallic salts, Orvus in contrast is stable in the presence of most metallic salts. It is these properties of Orvus, together with the fact that it dissolves rapidly and is easy to handle, which give the clue to its value in metal cleaning and plating.

Metal Cleaning

Orvus can be used both as the emulsifying agent in solvent emulsions or as an addition to straight alkali cleaning baths. John R. reports excellent success with the following:

Orvus WA Paste	12 per cent
Pine Oil	6 per cent
Water	12 per cent
Kerosene	70 per cent

This Orvus-Kerosene emulsion is made up by first adding the pine oil to the Orvus, then the water and finally the kerosene with constant stirring. Holding the mixture at 120 deg. F. aids in making the emulsion. The concentrated product is then diluted on the basis of one part of Orvus emulsion with 4 parts of water.

Another operator, using a highly alkaline silicate bath, adds one pound of Orvus for each 100 gallons of cleaning solution and an equal amount of Orvus to the rinse baths. He reports more rapid, thorough cleaning and far better rinsing. The properties of Orvus described above give

NEW Longer - Lasting Rack Insulation

UNICHROME* "AIR DRY" RACK COATING

Saves Time and Money!

Unichrome "Air Dry" Rack Coating will save time and money in your plating room—as it has for hundreds of others.

First, because of the speed and ease with which Unichrome "Air Dry" is applied. Racks can be dipped in the shipping container—coatings dry at room temperature.

Second, because the need for recoating is reduced. The thick, tough, flexible coatings withstand normal handling, hot cleaners and even severe plating cycles without chipping, peeling or splitting.

Third, because Unichrome "Air Dry," properly applied will reduce to a minimum any waste of valuable metals otherwise deposited on racks or fittings.

Here are the seven big time- and money-saving advantages at a glance:—

INSOLUBLE—withstands hot cleaners and all plating solutions

SAFE—contains no ingredients harmful to plating solutions

TOUGH—withstands wear and tear of handling

FLEXIBLE—withstands repeated flexing and bending

DURABLE—reduces the need for re-coating

CONVENIENT—any part can be patched without recoating the entire rack

EASILY APPLIED—dipping is done in the container in which it is shipped—the material dries at room temperature.

Address requests for further information or a trial order to the nearest office below.

UNITED CHROMIUM
INCORPORATED

51 East 42nd Street
New York, N.Y.

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Detroit, Mich.
Waterbury, Conn.

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us the answer to this. Orvus, being a wetting out and penetrating agent, assists the alkali to penetrate the foreign material on the surface of the metal. Not only does Orvus thus help the alkali get under the oily and greasy materials with which the metal is coated, but it also in itself acts as an emulsifying, suspending, and detergent agent.

In hard water, Orvus disperses any lime or other metallic soaps formed by a combination of the alkali in the cleaning bath with the fatty materials on the metal. These lime and metallic soaps are particularly harmful in the rinses, for as the metal passes to the rinse bath it contains a small amount of soap which is immediately broken down and deposited on the metal as insoluble lime soap scum. The scum may be in the form of streaks which are easily seen by the eye, or it may be in the form of microscopic particles which are practically invisible. In any case, the metal is not completely clean and plating will suffer.

It is to prevent these deposits from forming in the rinse bath that Fred T., operating a successful cleaning and plating business, uses a pound of Orvus per 100 gallons of rinse water. Orvus, of course, is not affected by the hardness in the water, does not form insoluble hard water salts, and thus maintains its effectiveness. Orvus in the rinse bath keeps the insoluble soap curds and scum from depositing on the surface of the metal, thus giving a chemically clean surface and naturally better plating.

Acid Dip

Plants employing an acid dip after cleaning and before plating find the addition of ¾ to 1 pound of Orvus to 100 gallons of the acid solution very helpful. The Orvus lowers the surface tension, bringing the acid into more intimate contact with the metal. This results in a more uniform action and a very effective bath.

Plating

The original work on the use of Orvus in the plating bath was carried out several years ago with the B. Company, who were particularly interested in finding a replacement for the hydrogen peroxide used to prevent pitting. The objection to the peroxide was that due to its constantly being used up, the nature of the plating solution was constantly changing, making good control difficult, if not impossible. The discovery that Orvus, simply through its physical action in releasing the hydrogen gas bubbles, made the addition of peroxide unnecessary was the beginning of wide Orvus usage in plating.

One of the best features of using Orvus in place of peroxide is that it is not affected chemically and is not used up. Thus, the only additions of Orvus necessary after the initial charge, which varies from 8 to 16 ounces per 100 gallons, are those made necessary when replacing normal "drag out" losses. In addition to replacing peroxide, the B. Company also found an added advantage in their dull nickel plating. Orvus produced a much finer grain and a heavier, more uniform coating. Because of its effectiveness as a surface tension lowering agent, plated pieces drain much more rapidly so that there is less drag out loss in going from the plating bath to the rinse bath. This is an economical feature to the use of Orvus.

Subsequent work has shown Orvus to be effective in lowering surface tension and as an anti-pitting agent in chromium and cyanide copper plating baths as well as in nickel plating. In precious metal plating, the savings effected in drag out alone make its inclusion in the plating

bath highly desirable. Generally Orvus is used on the basis of one pound per 100 gallons of plating solution, although some operators have found as low as 8 ounces to work effectively.

Rinses After Plating

As in the case of metal cleaning, Orvus is beneficial in the rinses following plating. As a rule, 12 ounces per 100 gallons of solution is an effective amount. This is sufficient to eliminate water marks, the main reason for using it. Elimination of water marks through the use of Orvus has in some cases eliminated the necessity of buffing.

Gold Dye Dip

Orvus applied on the basis of 8 to 16 ounces per 100 gallons of gold dye dip solution provides an excellent rinsing assistant and in some cases actually improves the finish. In most cases, it has eliminated the unevenness which so frequently occurs in this type of gold finishing.

Burnishing

The addition of Orvus to the soap solution used in burnishing small metal parts helps in freeing those parts from soap during the rinsing process. This has been found especially important in the case of metal parts which have crevices or intricate shapes. There have also been reports that burnishing balls stay clean for a longer period of time, probably due to the dispersion of the scale by the Orvus.

Add Defense Savings Bonds to your investments. Serve your country and conserve your earnings.

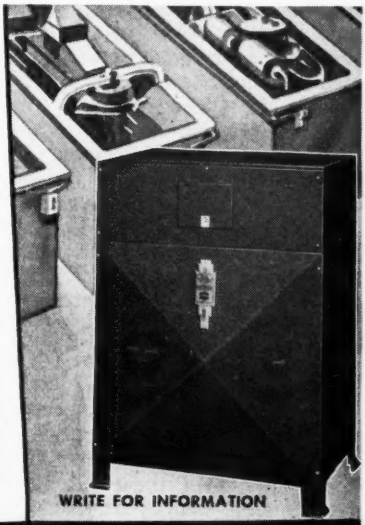
SAVE POWER with B-L ELECTROPLATING RECTIFIERS

They give each individual tank exactly the voltage required, and can be shut down entirely when not in use.

This is far more economical than a central power source, especially when you need various voltage for your tanks, or want to operate only a few of them.

B-L Rectifiers make your current supply flexible. They can be assembled in units, grouped in parallel or in series, and eliminate costly power waste.

B-L Electroplating Rectifiers are available in four standard models—300 and 500 ampere at 6 volts and 150 and 250 ampere at 12 volts, all for 220 or 440 volt 3 phase 60 cycle AC current supply. B-L Voltage Regulators also available.



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Engineers • Manufacturers
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B-L ELECTRICAL RECTIFIERS

Are Your Present Buffs "Satisfactory"?

By JOHN F. HARPER

Jackson Buff Corporation
Long Island City, N. Y.

RISING labor and material cost are providing headaches for the finishing industry. Scarcity of certain vital war materials is causing many changes in present methods, and there is every indication that this shut-off of key supplies will work real hardships on the finishing industry. But there is no reason to think that this branch of industry will take it lying down, and there is strong evidence to show that it is determined to turn an apparent disadvantage into a real advantage.

It is being realized that now is the time for a complete review of all methods, and a critical check on all supplies being used. It is being found that there are better methods and available materials, recent improvements which have been overlooked because in times of plenty it was thought that the methods and materials in use were "satisfactory." But today, it is essential that all possibilities be explored. "Satisfactory" really has no meaning, except as the result of comparisons, and these comparisons or checks against the newest developments must be kept up-to-date; or "satisfactory" conditions will become very costly and bothersome competitively.

The buffing room is an ideal place to look for savings through modernization. For years in most plants this has been one of the most neglected departments. In many cases the equipment and types of buffs used have not changed materially in years.

In many cases, the management of a finishing plant or department has bought the type of buff which its men have known for a great number of years; and by not making factual comparisons of all available newer types of wheels, the supply item of buffs very often has been twice as costly as it should be. How "satisfactory" is a type of buff which costs twice as much per unit of production as a newer type of buff which has never been investigated in a plant? The answer cannot be found until tests for comparison are made.

Of course, it is possible to turn out production with the same types of buffs which have been used for years. For certain jobs there have been no improvements in buffs. But in the vast majority of cases there has been progress in this, as in every other field. Thorough and continual checking into new methods and materials in the buffing field by the finishing department executive will pay real dividends. Only by fair comparisons can one determine whether buffs are really "satisfactory."

Color and Machine Tool Finishing

A NEW color system for painting machinery which reduces eye fatigue and promises to increase production was reported at the Atlanta meeting of the Illuminating Engineering Society.

Arthur A. Brainerd, of the Philadelphia Electric Company, and Matt Denning, of the Finishes Division of the Du Pont Company, gave collaborative findings of a two-year investigation into "Improved Vision in Machine Tool Operators by Color Contrast," which they said developed surprising results.

Studies of how brightness and contrast in paint colors on machinery

combined to increase the accuracy of seeing, thus reducing accident hazards, providing more comfortable working conditions, and also increasing production were presented in a color motion picture.

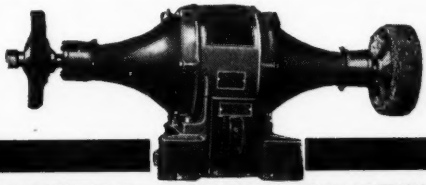
Many colors possessing higher light-reflecting factors than the conventional dark green or battleship gray of machine tools were tested under actual plant conditions, it was explained. Aluminum, light gray, light green, light blue, yellow, and light buff coats were applied in turn to a punch press and a power shear over periods of two weeks. Photometric readings were recorded of light falling on and reflected from working surfaces while time studies were made of production rates. Separate records were kept of the research under both incandescent and mercury lighting.

The psychological effect upon the operators, consisting of 15 men, including two foremen, was determined by a simple questionnaire. Results of the brightness measurements, the time studies and the questionnaire were correlated.

Ratings on the basis of 100 showed light buff and light gray with the highest scores, aluminum standing very high and light blue showing promise.

In order to render the results practical from a maintenance standpoint, a compromise was made by painting all machines in horizon gray and spotlighting the working area with light buff. Surprisingly, the combination seemed to perform better than any of the solid colors.

Field investigations are currently being conducted in several industrial concerns and more complete data should soon be available, the illuminating engineers were told.



The Direct Drive Bench Type Marschke Buffer. 1 and 2 HP.

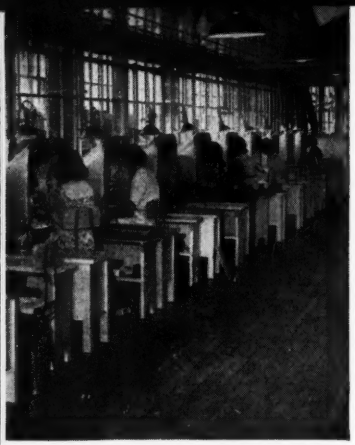
SUPERB BUFFERS—FOR EVERY REQUIREMENT

THE MARSCHKE LINE includes Swing Frame Buffers—for large surfaces and heavy work pieces—as well as a variety of pedestal type machines with direct motor drive and multiple wheel speeds. Whatever your buffing requirement, there's a Marschke built to save you money. Marschke quality pays off in many trouble-free years of usefulness.

Write today for Marschke Buffer Bulletin, to

VONNEGUT MOLDER CORP.,
1845 Madison Ave.,
Indianapolis, Ind.

The Simplified Swing Frame Multiple-Speed Marschke Buffer.



News OF THE INDUSTRY

Strow Joins MacDermid

MacDermid, Incorporated, Waterbury, Conn., manufacturer of compounds and processes for the cleaning of basis metals, announces the appointment of Mr. Henry A. Strow as chief chemist.

Mr. Strow, after graduation from Purdue University, was employed by the Udylite Corporation as research chemist and more recently as maintenance service engineer of Detroit Transmission Division of General Motors Corporation, Detroit.

New Appointments to Clover Field Sales Staff

The Clover Mfg. Co., manufacturer of coated abrasives and lapping and grinding compounds, Norwalk, Conn., announces the following appointments to the Clover field sales force: Mr. L. P. O'Neill has been assigned to the Chicago territory. He brings to his new duties an experience of over 20 years in the coated abrasive industry, during which he served in an executive sales capacity with such companies as the Herman Behr Company and Abrasive Products, Inc. Mr. L. W. Kilpatrick has been made sales representative to cover the states of North and South Dakota, Minnesota and northern Iowa. Mr. Gerald R. Barrett has been transferred from the metropolitan New York area to Boston. He will serve the entire New England territory.

William K. Cusick Joins International Rustproof Corporation

William K. Cusick has resigned his position with Parker Rustproof Company to take charge of engineering and sales work for the Irco Zinc Coat Division of International Rustproof Corporation, 12507 Plover Ave., Cleveland, Ohio.

Mr. Cusick is a graduate of Ohio State University in Chemical Engineering and his years of experience in the rustproofing field is a valuable asset in solving many production problems.

William K. Cusick

Corrosion Control Corporation Moves to New Location

The Corrosion Control Corporation recently announced its removal to its own building at 34 Smith St., Norwalk, Conn. The executives offices, laboratory, and entire manufacturing equipment are now located in this building.

The company's improved and greater production facilities, and complete modern research laboratories will enable it to render better and more complete service.

War Department Conserves Vital Defense Materials

The War Department is conserving vital materials such as aluminum, rubber, zinc, copper, and nickel used in defense production by substituting more readily available materials in hundreds of articles of equipment purchased for the Army.

Quantities of critical defense materials have been eliminated or reduced in specifications for approximately 300 different pieces of equipment purchased by the Quartermaster Corps. New specifications have already been made for nearly as many more items, to take effect when manufacturing begins to replace supplies now on hand.

Brass and bronze have been eliminated from belt buckles, rifle scabbard snaps, nuts, bolts and electric fixtures. Malleable iron and steel have been substituted in 96 items of equipment manufactured by the thousands for the Army.

In the search for a nickel substitute, the Army has turned to wood, vitrified clay, cast iron, galvanized iron, steel, and glass. The substitute materials receive a special finish to make them suitable for use in all sorts of table tops used in army kitchens and hospital laboratories, electric fixtures, steam kettles and half a hundred other items.

Zinc has been saved in more than 50 different pieces of equipment by substituting methods of galvanizing and finishing on such things as galvanized piping, electric tubing, fences, armored cables and steel flag poles. Elimination of zinc in brass and bronze has also saved quantities of this element for more important uses.

The aluminum shortage has caused the substitution of other less vital materials in more than 30 separate supplies. Cast iron and corrosive-resisting steel cooking utensils are replacing aluminum equipment in army kitchens. Galvanized iron or corrosion-resisting steel is now used in much laundry equipment. Aluminum has been replaced by non-metallic materials on many army table tops, by mirror glass in reflectors and by wood and steel in chairs.

METSO CLEANING SOLUTIONS

Good Electrolytes

RAPID cleaning calls for solutions of high conductivity and here again the Metso Cleaners serve the electroplater. Metso also furnishes a chemically clean surface, which insures quality plating.

In leading plants Metso cleans steel, nickel or copper in 3 minutes without preliminary soaking. One plater tests the adherence of nickel plate with a knife blade!

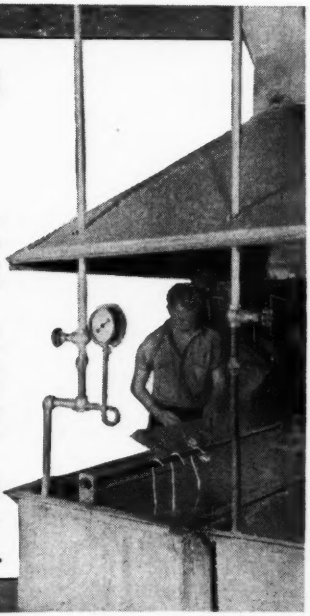
Send for a copy of Bul. #337 showing a comparison of conductivities of Alkali Solutions at 20° C. and 100° C.

METSO CLEANERS

Sodium Metasilicate and Sesquisilicate

PHILADELPHIA QUARTZ CO.

General Offices & Laboratory: Ionic & 3rd Sts., Phila.



Copper used in wrapping wire, construction work and a dozen other ways has been replaced in specifications by such materials as porcelain, glass, black iron, lead, galvanized iron and corrosion-resisting steel.

Many of these savings in critical and strategic materials are small by themselves. When added together, however, from the thousands of items of supplies, equipment, and material purchased by the Army they show a sizable saving. Materials conserved wherever possible stretch out the supply of scarce goods that may be used elsewhere.

Charles R. Allen Appointed American Buff Representative

The American Buff Co., Chicago, Ill., has announced the appointment of Mr. Charles R. Allen as its New England representative. Mr. Allen's address is P. O. Box 65, Wethersfield, Connecticut.

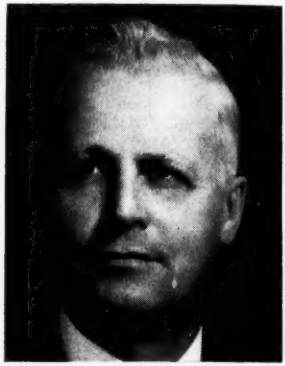
During the past 15 years, Mr. Allen has been serving the buffing and polishing industries. He is a member of the American Society of Tool Engineers and possesses an unusual knowledge of the entire field of buffing and polishing operations. Mr. Allen says: "I can and will help any customer on his plating as well as his polishing and buffing problems. My many years as a production expert have qualified me to eliminate much lost time and to produce greater efficiency."

Charles R. Allen

Mr. Allen is particularly experienced in working with ever improving modern methods of buffing and polishing. Due to his training, he has been very successful in making complete layouts and installations.

Hubbell Joins Pemco Sales Staff

The Porcelain Enamel & Manufacturing Company, Eastern and Pemco Aves., Baltimore, Md., recently announced the appointment of George L. Hubbell as sales engineer for the midwestern territory. Mr. Hubbell has had wide experience, having formerly been district sales manager for the Globe Wernicke Company, production manager and southeastern sales manager for the E. F. Hauserman Company, manufacturer of steel products and recently connected with the Home Owners' Loan Corporation, Washington, D. C.



George L. Hubbell

Courses in Electroplating to Aid Workers in Defense Industries

The Institute of Electrochemistry and Metallurgy, 59-61 E. Fourth St., New York City, offers specialized courses in the field of electroplating and metallurgy during 1941-42. Registration is now being held for the fall term. The following studies are offered.

Electroplating I. The course is designed to give the electroplater or industrial worker a foundation in chemistry including qualitative and quantitative analysis. One hour each evening will be devoted to class lectures in which will be discussed the theories of

modern chemistry as applied to electroplating. The remaining hours will be devoted to the laboratory where the student will conduct his own experiments. Tuesday and Wednesday from 7:30 to 11:00 P. M. Dr. Young and Mr. Klinsevich.

Metallurgy I. The student will be introduced to the structure of metals and alloys and factors are taken into account which affect these, such as temperature, mechanical working, and so on. The application of the phase rule to physical metallurgy will be discussed. Both binary and tertiary systems will be studied and illustrated. Heat treating, surface treating and testing of metals and alloys will be studied. Tuesday and Wednesday, 8:30 to 9:30 P. M. Dr. Young and Mr. Klinsevich.

Research I. This course is designed to give the practical electrochemist a chance to investigate problems in his field. One-half hour per week is devoted to a conference with the instructor in which the method of attack is laid out. The remaining time is spent in the laboratory where the student applies his knowledge and technique to the solving of problems which arise in such investigations. Tuesday and Wednesdays, 7:00 to 11:00 P. M. Dr. Young.

Industrial Microscopy IA. This course is specially planned in photomicrographical analysis, general microscopy, and instruction on the metallographic microscope. Subjects covered include the preparation of materials and the proper selection of optical equipment, methods of illumination, control of glare, illumination by incident light, and the use of color filters, special methods of particle-size determination, determination of refractive index, micrometry, and the proper use of mounting media with respect to its relative refractive index. Work with the polarizing microscope may also be arranged. Mr. Shillaber.

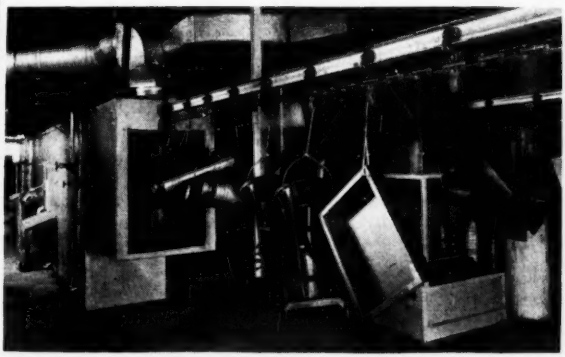
For men outside the New York area, a course in electroplating by correspondence has been written. For further information, write to Dr. C. B. F. Young, Box 292, Flushing, New York.

Detroit Rex Shifts Managerial Staff

Effective immediately, Mr. S. A. Harris has been appointed eastern regional manager of Detroit Rex Products Company.

Mr. W. F. Newbery, formerly eastern regional manager, has been promoted to the general office, 13017 Hillview Ave., Detroit, Mich., on special duties.

F. H. LAWSON CO. CLEANS MANY PRODUCTS IN RANSOHOFF MACHINE



A wide variety of sizes and shapes of kitchen stools, hampers, cabinets, waste baskets and other steel products are thoroughly cleaned by this RANSOHOFF Monorail Wash, Rinse and Dry Machine in The F. H. Lawson Company plant, Cincinnati, Ohio.

The products are washed by a hot alkaline solution, given two hot rinses followed by an air blow-off, then through a hot air drier. The work is carried through the machine suspended from hooks attached to a chain conveyor.

For Better Cleaning Consult a RANSOHOFF Representative

N. RANSOHOFF, INC.

TOWNSHIP AND BIG FOUR R. R. CINCINNATI, OHIO

J. J. Canfield Perfects Coating Calculator

Dr. J. J. Canfield, who perfected the new weight calculator for porcelain enamel coatings, is well known among

J. J. Canfield

enamelers through his close association with the industry. As a member of the ARMCO Research Laboratories staff, American Rolling Mills Co., Middletown, Ohio, since 1928 he has specialized in the enamel and enameling iron research fields.

Dr. Canfield was born in Jennings, Oklahoma. He received his Bachelor of Arts degree in 1916 from Oklahoma A. and M. College and earned his Master of Science and Doctor of Philosophy degrees while teaching chemistry at Iowa State College. After obtaining his Doctor's degree in 1926, he worked in the Oklahoma oil fields for two years

Porcelain Enamel Coating Weight Calculator

before becoming associated with ARMCO. He is a member of the American Chemical Society, American Ceramic Society, Sigma Xi, Phi Lambda Upsilon and Phi Kappa Phi, the last three being honorary scholastic fraternities.

Organization Changes Announced by Tolhurst

Wayne Mendell, general sales manager, American Machine and Metals, Inc., East Moline, Ill., has announced important changes in personnel of the Tolhurst Centrifugal Division.

Howard H. Harlan, sales engineer and recently manager of the New York office of Tolhurst, has been appointed technical assistant to the general sales manager, with offices in Washington D. C., where he will maintain contact with federal government offices. Mr. Harlan will also visit the factory at East Moline periodically as technical advisor to the sales department.

George P. Hebard, formerly advertising manager, U. S. Hoffman Machinery Corporation, district manager for Fletcher Works, Inc., and recently sales and advertising manager of G. H. Bishop Company, has been made field sales promotion manager.

Branch office changes include the appointment of J. R. Angel as manager of the New York office and W. C. Davis in charge of the Atlanta office. Mr. Angel was formerly manager of the Atlanta territory for Tolhurst, while Mr. Davis represented the company in Maryland, Virginia and District of Columbia. Prior to joining Tolhurst, Mr. Davis was associated with Du Pont and the General Chemical Company.

Carborundum Exhibit

The Carborundum Company, Niagara Falls, N. Y., recently announced the dedication of an educational exhibit, telling the story of modern manufactured abrasives, at the Chicago Museum of Science and Industry, Chicago, Ill. One of the striking features of the Carborundum exhibit is the reproduction of the laboratory of the late Dr. Edward Goodrich Acheson, in which he created the first man-made abrasive silicon carbide to which he gave the name "Carborundum." The old laboratory, originally located at Monongahela City, Pa., is reproduced in every historic detail. There is a replica of the old work table on which was placed the iron bowl, such as used by plumbers for the melting of solder, in which Dr. Acheson created the first few crystals of an abrasive, destined to revolutionize grinding.

In the center of the exhibit space is a revolving mound of gorgeously colored crystals of Carborundum Brand Silicon Carbide, reflecting all the colors of the

spectrum under the brilliant lighting from the ceiling. This crystal mound is set on a circular base of black marble.

The detailed processes involved in creating the two abrasives, Carborundum Brand Silicon Carbide and Aloxite Brand Aluminum Oxide, are portrayed in a series of diaramas showing exact models of the electric furnaces in which these abrasives are produced. Then follows various scenes, in diarama, showing the crushing and grading of the crude abrasives, the making of grinding wheels—in fact all of the major operations necessary in producing modern abrasive products. Each scene is interesting and dramatic and is an exact duplicate of each of the original departments in the plant of The Carborundum Company. Above each diarama are photo-murals taken in the plant and showing the actual scenes from which the diaramas were made. Explanatory text completes the story.

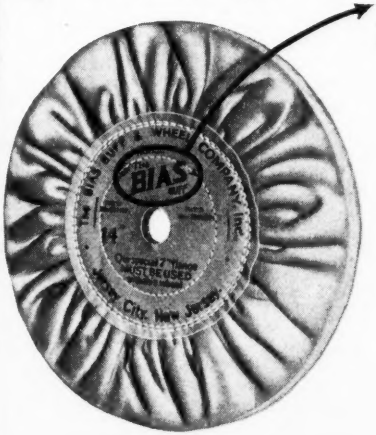
Sherwin-Williams Builds Ordnance Plant

Plans have been completed by The Sherwin-Williams Company, Cleveland, Ohio, for construction, management and operation for the government of a huge bomb and shell loading plant known as Illinois Ordnance Works, to be built on Crab Orchard Lake, Marion, Ill., the war department recently announced. The department's official announcement concluded a series of discussions between Army Officials and Sherwin-Williams' board chairman George A. Martin, and president Arthur W. Steudel.

A separate company known as The Sherwin-Williams Defense Corporation has been set up to operate the new project on a management contract with headquarters at Cleveland, Ohio. By this action, the world's largest paint manufacturer makes available to the government many of its trained management and production experts.

In charge of the new ordnance plant's operation will be E. E. Ware, vice-president of The Sherwin-Williams Co., who for many years has been technical advisor to the president. In addition to many years of chemical engineering and operating experience in the paint industry, Mr. Ware was active in the World War Muscle Shoals development, where he served as a Lieutenant Colonel. For the past two years, Colonel Ware has been in charge of developing and operating the new Sherwin-Williams Titanium Plant at Gloucester, New Jersey.

If the buffs you now use have



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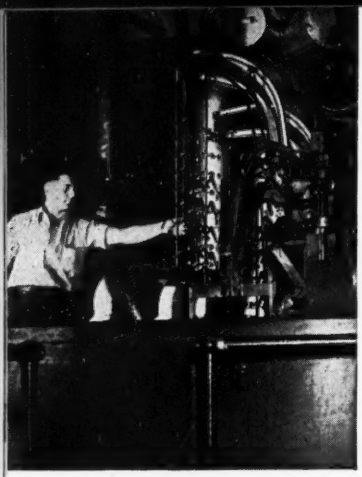
--you are getting the better buff service at the lower cost

It is possible to pay less for certain "types" of buffs than for a genuine 100 per cent BIAS BUFF. And by paying less you also get less service, less lasting quality and very much less satisfaction. You also discover that they cost you more in the long run than the BIAS BUFF!

There's a BIAS made for every buffing job—and also a BIAS Ventilated Buff. *Try BIAS Buffs.*

The BIAS BUFF *and* WHEEL CO., Inc. 430 Communipaw Ave. Jersey City, N. J.



New PLANT EQUIPMENT AND Materials

Jefferson Endless Belt Sander

The Jefferson Machine Tool Co., 750 W. Fourth St., Cincinnati, Ohio, has placed on the market an endless belt sander which is said to eliminate costly hand sanding and finishing. Large, flat, as well as concave or convex surfaces on metal can be finished in the same manner as hand work, but with lightening speed. The flexible sanding belt of the Jefferson Endless Belt Sander is said to respond quickly to the operator's touch.

A substantial table travels on ball-bearing rollers and is easily moved back and forth while the operator applies pressure to the flexible belt with a block or pad. The belt travels at just the right level to enable the operator to work in a natural position, thus eliminating fatigue.

The overhead idlers of the Jefferson Endless Belt Sander are said to keep the upper travel of the belt up and out of the operator's way. Sanding belts can be easily and quickly changed. A vertical adjustment of 10 in. of the table provides for work of unusual thickness. The belt standards may be set as far apart as desired to accommodate long surfaces. An auxiliary work table can be placed on the regular table for handling exceptionally long workpieces. The table stand may be readily moved to one side for special work.

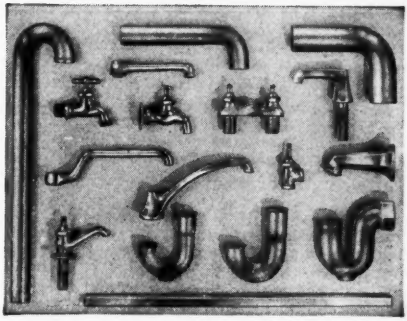
The belt standards are independent and built of heavy structural steel, electrically welded to form a rigid unit. They are self-supporting. The table frame is also built of heavy structural steel, electrically welded to form a rigid and substantial foundation for the table. The table stands 32 in. from the floor and is adjustable up to 42 in. The table top is 36 in. wide by 80 in. long, is built of heavy maple and is mounted on ball bearing rollers, thus making it easy to move backwards and forwards. A conveniently located locking device makes it possible to lock the table in any desired position. An adjustable stop bar attached to the table is furnished to hold the work in place. A metal rod, the full length of the table, serves as a handle for moving the table back and forth.

The main sand belt pulleys are 12 in. in diameter by 8¾ in. face, and the two overhead idler pulleys are 6 in. dia. and 8¾ in. face. The pulleys are accurately machined all over and dynamically and statically balanced to eliminate all vibration at high speeds and operate on high grade, dust-proof ball bearings.

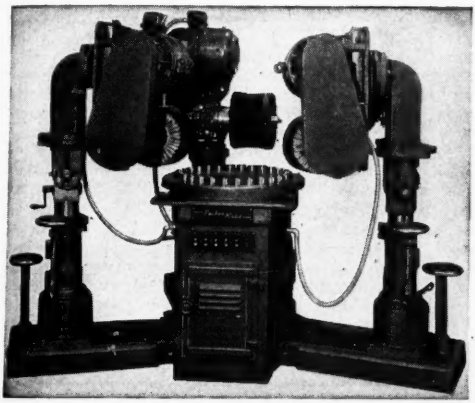
Jefferson Endless Belt Sander

•AUTOMATICALLY

PLUMBERS
BRASS
GOODS..



POLISHED & BUFFED



PACKER-MATIC No. 424 CONTINUOUS ROTARY

ON THE EFFICIENT

PACKER-MATIC

Speed-up Production and lower manufacturing costs by Finishing your Parts Automatically on PACKER-MATIC. There's a type of PACKER-MATIC for your most difficult to finish part. WRITE for a Factory Time Study—SEND part and finish desired.

•AUTOMATIC POLISHING & BUFFING MACHINES

Packer-Matic

THE PACKER MACHINE CO., MERIDEN, CONN., U. S. A.

The belt can be kept in true alignment at all times by means of a conveniently located hand wheel adjusting screw. One idler pulley is equipped with an adjustable counterbalancing spring mechanism to regulate the tension of the belt. The pulleys will accommodate belts up to 8 in. width.

The Jefferson Endless Belt Sander is provided with a direct drive from 2 h.p. fully enclosed dust-proof ball bearing motor 220 or 440 volts, A.C., 3 phase, 60 cycles.

American Optical Safety Poster

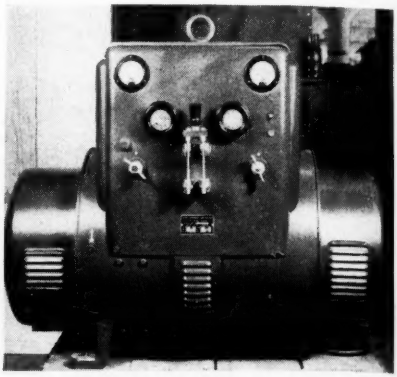
American Optical Company, Southbridge, Mass., announces it will be glad to place any industrial firm on its mailing list for a free safety poster service inaugurated several years ago. At certain intervals during the year, dramatic, colorful safety posters, driving home to workers the value of safety precautions, are made up and mailed to concerns desiring the service.

The optical company emphasizes that in these days of defense programs, overtime wages and production schedules, the value of a consistent, well-planned safety program cannot be overestimated. For example, according to recent statistics, the first two months of 1941 in comparison with the same period of time in 1940 saw a manufacturing employment increase of 9 per cent while occupational accidents jumped 7 per cent. Such an accident record cannot fail to reduce production and increase production costs.

To combat this trend, American Optical Company suggests compulsory wearing of safety equipment on hazardous jobs and the distribution of educational material such as safety posters to remind workers that the exchange of their own precious eyes for glass eyes is the height of a poor bargain.

Motor Generator Anodizing Unit

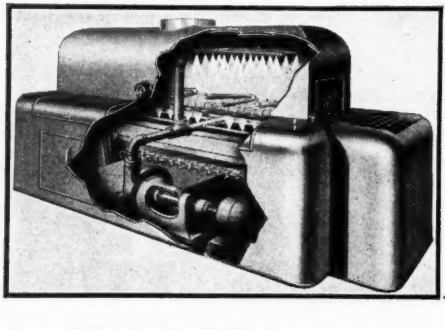
Motor Generator Corporation, Box PF 101, Troy, Ohio, has announced a complete line of anodizing machines avail-



Motor Generator Anodizing Unit

able from 125 through 875 amperes at 20, 40, or 50 volts D.C. Motor sizes range from 7½ through 55 h.p. generating from 5 to 35 KW. Each machine is furnished complete with control cabinet ready for anodic treatment of aluminum and its alloys whether the Alumilite, Bengough-Stewart, or Bureau of Standards process is used in the operation.

Features of the anodizing sets are: Constant speed guaranteeing constant voltage and close control over the entire current range. Positive voltage regulation insures continuous capacity with high overall efficiency. Compact single unit construction, ball bearing



HYDRO-FLOW
Industrial Washing Machines

Streamlined design. Hidden motors, pumps and pipes are easily assembled. Piping and nozzles located to insure thorough cleansing of all surfaces. Rugged and efficient pressure pump. Corrosion resistant spray nozzles—from mist to open stream. Monorail, Belt or Gravity type conveyors designed to carry any shape or size material. Variable speeds on conveyor drive synchronize production.

International Conveyor & Washer Corp.
Write for circular.
640 E. FORT ST. DETROIT, MICH.

mounted, offering longer life with less maintenance.

Units are equipped completely with separate exciter; control cabinet housing an accurate reading ammeter with shunt-voltmeter; exciter and generator field rheostats; double pole, single throw work circuit switch; positive and negative terminal studs; and across-the-line switch giving overload as well as under voltage protection or release to the motor.

Liganto

Liganto is a liquid compound which is said to shield the hands from grime, paint, grease, oil, and many chemicals and is now being marketed by Simplex Chemical Corp., 26-21 Jackson Ave., Long Island City, N. Y. This liquid hand preparation when rubbed on the hands will dry in two minutes and cover the surface of the skin with a thin, non-permeable, elastic film, similar to a glove, which only water will dissolve. This glovelike film has the unique property of being visible by its lustre, thus indicating any spot on the hands left uncovered.

Liganto guards the worker's hands against skin irritations, infection and dermatitis frequently resulting from contact with solvents like benzine, turpentine, toluol, and so on. Liganto is said to leave the hands smooth and soft and requires no harsh soaps or strong solvents to clean up. The material is available in ½ pint containers.

M. S. A. Ear Defenders

Fatigue, irritability and nervous exhaustion experienced by workers in or about noisy operations are lessened by the use of M. S. A. Ear Defenders which reduce loud noises by 35-45 decibels or to about 1/10 their former loudness, yet are so designed that warning signals and conversation can easily be heard. The resulting effect from the reduction of noise will enable the workmen to better concentrate on their jobs and thereby increase their efficiency. M. S. A. Ear Defenders are marketed by Mine Safety Appliances Company, Braddock, Thomas and Meade Sts., Pittsburgh, Pa.

M. S. A. Ear Defenders were scientifically designed, after long research and experiment, by Dr. Vern O. Knudsen, a recognized authority on Acoustics, Professor of Physics at the University of California at Los Angeles, and Dr. Carey P. McCord, Medical Director, Industrial Health Conservancy Laboratories, Detroit, Michigan.

Essentially, each M. S. A. Ear Defender is a tapered tube molded from surgical-type soft rubber; consisting of

M. S. A. Air Defenders

two barriers, an outer one of metal and an inner one of soft rubber, separated by an air space. This tapered construction permits easy insertion and removal without any danger of coming in contact with the ear drum.

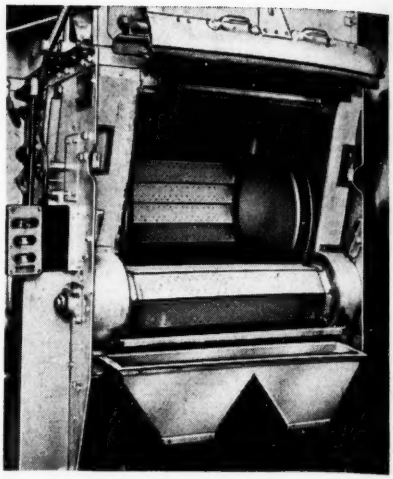
M. S. A. Ear Defenders can be easily cleaned with soap and water, thus insuring a sanitary article at all times. The cost to the user is thus relatively

RUST-I-CIDE "50"
CLEANS METAL
Easily and Quickly
. . . and provides a foundation for good, lasting finishes.
RUST-I-CIDE "50"
★ Imparts better adhesion by mildly etching.
★ Gives longer life by preventing rusting from within.
★ Chemically cleans—dissolves and *removes* common shop accumulations.
★ Instantaneous action and low cost.
That's why so many companies working on defense orders are using RUST-I-CIDE
RUSTICIDE PRODUCTS COMPANY
Cleveland, Ohio

low in comparison with other ear protectors which must be discarded after being used a short time. M. S. A. Ear Defenders are packed in an attractive plastic pocket container with spring hinge cover, which will keep them clean when not in use and provides a convenient carrying case.

Wheelabrator Double Hopper Trough Feed

A double hopper trough feed which can be used in connection with a Wheelabrator Tumblast has been placed on the market by American Foundry Equipment Company, Mishawaka, Ind. This double hopper trough feed is said to prevent spillage of small workpieces in removing the work from the tumblast unit after the parts have been blast cleaned.



Wheelabrator Double Hopper Trough Feed

After the workpieces have been blast cleaned, they are unloaded directly from the airless abrasive blast cleaning machine into shipping barrels. The double hopper trough feed into which the cleaned parts pass is said to eliminate extra handling brought about through the hauling of cleaned material to the shipping department in containers and later transferring the parts into shipping barrels.

In cases where parts being cleaned require further processing after the blasting step, this trough does not interfere with their discharge from the Wheelabrator Tumblast to any other kind of suitable tote boxes for conveyance to other departments in the plant.

Reco Heat Circulator

A heat circulator designated as the Reco Heat Circulator has been placed on the market by Reynolds Electric Company, 2650 W. Congress St., Chicago, Ill. This circulator was designed to remove the ceiling heat and the heat

Real Rustproofing with

IRCO ZINC COAT

The five minute zinc phosphate chemical-bath process, easily designed to fit your production requirements.

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- **Easy to apply**
- **Inexpensive to use**

With today's shortage of coating metals, ZINC COAT information is important to executives who must find a suitable substitute for galvanizing, tin, cadmium, zinc, nickel, etc.

Write for ZINC COAT treatise.

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THE ROBERTS ROUGE CO., Specialists in manufacturing thoroughly dependable Gold, Sterling and Silver Plate Rouges; Stainless Steel, Chrome and Crocus Compounds. STRATFORD, CONN.

pockets that exist over radiators and registers, and circulate this heat throughout the room.

The Reco Heat Circulator is equipped with a super power fan that blows the air to the ceiling and down the walls and back again, thus providing complete air circulation in the room at a uniform temperature. This condition is said to result in a big reduction in the amount of fuel required to keep the room or shop comfortable. The Reco Heat Circulator is manufactured in many sizes and types.

Duotrol

The Automatic Control Company, 1005 University Ave., St. Paul, Minn., recently announced that its Duotrol, a combined air volume and water level control for pressure (hydro-pneumatic) tanks, has been improved.

The newly redesigned Duotrol consists of a pressure switch containing two separate bellows mounted above an enclosed type float switch. The improvement announced by the company is in the use of an entirely different type of float switch for the control of the water level, making the control a much simpler device and containing fewer parts to get out of order.

The Duotrol maintains the water level in the tank and checks and corrects the air volume at the end of each pumping cycle. The scheme of operation of this control is to start the pump on a drop in pressure and to stop it on a rise in water level. The air compressor is started only when actually necessary by a contactor on the float switch and the high pressure switch together in series, and is stopped when the high pressure switch opens. The complete device is 15½ in. high and is mounted on the end of the tank.

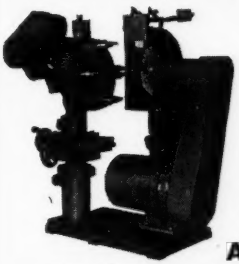
Hubbell-Weisberg Zinc Plating Process

A new method of electroplating steel products with zinc to be known as the Hubbel-Weisberg Process is now being marketed by the Hanson-Van Winkle-Munning Co., Matawan, N. J. This process will be of interest to manufacturers of wire, strip, and other metal products who can now use waste instead of new metals. The chief advantage of the process is said to line in the utilization of cheap zinc instead of zinc anodes.

Zinc is dissolved from galvanizer's skimmings, brass foundry fume, organic reduction residues or ore, by means of a solution of ammonium chloride and ammonia. Insoluble graphite anodes are used in the plating tank. The plating operation reduces the zinc content of the plating solution which is then returned to the leaching plant where the zinc removed by plating is replaced.

The handling of the work in the pickling and cleaning operations is the same as for other available zinc plating processes. The plating tank for the Hubbell-Weisberg Process has been specially designed to take advantage of the fact that anodes seldom have to be replaced, and to provide covers which pre-

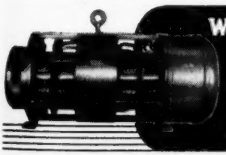
Get Hep to This for Polishing and Buffing! Faster and Cheaper



ACME SEMI-AUTOMATIC and Lathe Combination Unit

One of the many Acme Automatics designed to speed up production and reduce production costs. Send sample for free production estimate.

ACME Manufacturing Co.
1642 HOWARD ST. • DETROIT, MICH.
Builders of AUTOMATIC POLISHING AND BUFFING MACHINES FOR OVER 25 YEARS



WRITE FOR LATEST CATALOGUE ON
NEW LOW COST PLATING
with MGC Electroplating Equipment
MOTOR GENERATOR CORP., Box PF-111 Troy, Ohio, U.S.A.

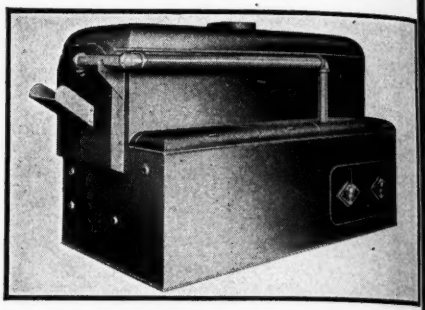
vent the escape of ammonia fumes and at the same time permit easy re-threading of wires or strips.

The Hubbell-Weisberg Process operates at high current densities and this combined with the high conductivity of the solution and the careful design of the electrical equipment, from generator to contactor, provides a process which is said to be highly economical of electric power.

International Horizontal Rotary Type Wash Unit

The International Conveyor and Washer Corporation, 640 E. Fort St., Detroit, Mich., has developed and is now marketing a horizontal rotary type wash unit. The work processed in this unit is loaded into a hopper at one end and by means of a spiral in the perforated drum, it is moved to the exit end. Small flights fastened to the drum, pick up the work and turn it over and thus provide a means for the spray to cover the work from all directions.

Units of the type shown in the illustration are available in various size diameter drums. The unit shown is 10 ft. in length and is provided with approximately 5 ft. of drying space. A specially designed separating baffle attached to the spiral keeps the spray from entering the drying chamber.



International Horizontal Rotary Type Wash Unit

Most of the units are unheated and depend upon the tumbling of the work for drying. However, the machine is built with openings on each side of the drum into which pipe burners may be inserted if heat is required.

The International Horizontal Rotary Type Wash Unit may be furnished with steam coil and injectors for heating the cleaning solution or with gas fired unit with automatic controls. The tanks are complete with removable screens, overflow skimmer, drain, water inlet, clean-out, and dial thermometer. Power regulators for steam coils are available.

The rotary machine is available with a wash-rinse and dry stage. All parts are completely enclosed with quick opening panels or doors for accessibility to all moving parts. Motors are specified to be ball-bearing, totally enclosed, fan cooled.

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FINISHING
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Headquarters for sanding, rubbing and buffing compounds, tripoli, grease stick, rouge, white finish, emery cake and paste.

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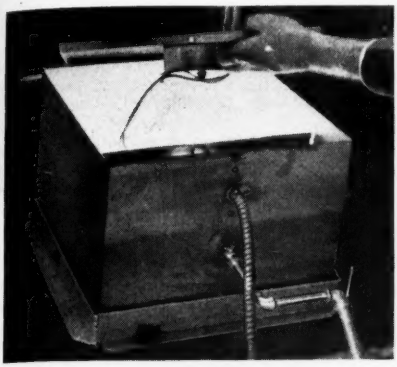
TANK SLUDGES ARE VALUABLE
We will purchase Tin—Cadmium—Tungsten —Molybdenum sludges and residues.
Any quantity.
Send samples—Will quote promptly.
Also buyers of all grades of plating room scrap.
Metallurgical Products Co.
Established 1909
Converters—Reclaimers—Processors
35th and Moore Sts. Philadelphia, Pa.

Holophane Spray Booth Lights

A lighting arrangement for illuminating large paint spray booths has been placed on the market by the Holophane



Holophane Spray Booth Lights

Company, Inc., 342 Madison Ave., New York, N. Y. A new style prismatic reflector is used for a window to provide illumination of the vertical surfaces of the booth.

Danger of explosion is said to be eliminated through the use of Holophane Spray Booth Lights.

Quaker Quasol No. 80

The Quaker Chemical Products Corp., Conshohocken, Pa., has placed on the market a cleaning compound to be known as Quasol No. 80. This material is designed specifically for removing grease, oil and dirt from all types of metals in washing machines. It also leaves a temporary rust preventive film on the work.

In application, Quasol No. 80 can be mixed with water in a proportion of 1 gal. to from 25 to 75 gal. of water depending on the difficulty of the cleaning job. The temperature of the solution is maintained between 130 and 160 deg. F.

Quasol No. 80 is said to be inexpensive to use since the oils float to the surface of the emulsion and can be removed in the skimming tank attached to the washing machine. In this manner, the cleaning solution is always kept free of grease and will continue to give good results almost indefinitely, according to the manufacturer. The only loss is said to be drag-out, and fresh water and material must be added from time to time to compensate for this.

Alvey-Ferguson Rotary Drum Type Washing Machine

The Alvey-Ferguson Co., 75 Disney St., Cincinnati, Ohio, has placed on the market a rotary drum type washing

BLACK for Iron and Steel

Original, low temperature, patented method

Superior
ABRASION-RESISTANCE
RUST-RESISTANCE
ECONOMICAL . . . FAST

Ask for details. Sample JETALized free.

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PROVIDENCE, R. I.

the JETAL process

Assures Better and Faster FINISH BAKING

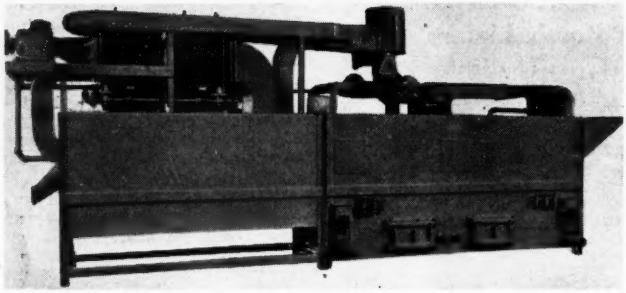
The proper finish baking oven will improve results, eliminate rejects, speed up production and cut costs. See Despatch for proper recommendations and the proper oven for better and faster finish baking.

FOR DEFENSE

A DESPATCH OVEN BAKING FINISH ON MOTORS

WRITE FOR DETAILS

DESPATCH OVEN COMPANY
MINNEAPOLIS, MINNESOTA



Alvey-Ferguson Rotary Drum Type Washing Machine

machine designed specifically for processing small cartridges.

By means of this unit, the small cartridges can be washed, rinsed, soaped and dried.

The Alvey - Ferguson Rotary Drum Type Washing Machine is constructed of corrosion-resisting metal. An indirect gas-heated dryer (with which the unit is equipped), is automatically kept to the desired temperature.

In processing, a large quantity of cartridges may be dumped into the loading hopper at one time and the machine automatically feeds itself at the proper rate of flow. A discharge chute is equipped with a gate which permits accumulation while the conveying trucks are being changed.

Dixon Metal Marking Pencils

Purple and green are now available in the "Phano" line of pencils, manufactured by the Joseph Dixon Crucible Company, Jersey City, New Jersey. This brings the range of colors of the Phano pencils to ten.

The amplified color range in this pencil is significant, because Phano is used largely for marking highly polished metal, as well as other glazed surfaces. The Phano pencil is specially designed to leave a clear, durable mark on polished surfaces without danger of scratching or scoring.

There is a broad field of application for Phano in industry, where it is necessary to mark metal parts for future identification or where instructions to workers or inspectors must be written on the part without danger of damaging the piece through abrasive action.

The greatly expanded aviation industry is finding Phano useful for a myriad of tasks where an ordinary pencil falls short or is liable to damage expensive parts. Phano leaves a mark which adheres well, yet which may be removed when the operation is completed. The range of ten colors enables parts to be marked for positive and instant identification throughout the whole manufacturing process. Phano provides the answer to layout work directly on the metal, since markings made with it will not wash off when the metal is sprayed during the cutting. Layouts made directly on aluminum and stainless steel are common practice in the aviation industry.

The Phano line now includes red, yellow, black, vermilion, blue, white, purple, green, light green and Pyro-red (brown).

HARSHAW ANODES AND CHEMICALS

meet the highest standards of the plating industry . . . Anodes and chemicals for every kind of plating.

THE HARSHAW CHEMICAL CO.
Cleveland, Ohio and Principal Cities

Torit Cyclone-Type Dust Separator

The Torit Manufacturing Co., 296 Walnut St., St. Paul, Minn., is now marketing cyclone-type dust separators for collecting dust from grinding and polishing wheels. They are available for use with or without filter bag collectors and draw dust-laden air from hoods surrounding polishing, grinding wheels, etc. Thru centrifugal action a high percentage of dust (75 to 95 per cent by test) entering the dust separator falls into the bottom chamber. The small amount that does not separate from the air stream inside the separator is exhausted thru a center pipe having its outlet on top of the unit. The captured dust is easily removed when necessary thru a door in the dust chamber — the only cleaning that is necessary.

Torit Cyclone-Type Dust Separator

Where filter bag collectors are used and there is a possibility that the bags will be overloaded by the great volume of dust to be collected, or clogged from sticky buffing lint, a combination filter bag cabinet and cyclone separator is advisable. Since the separator would catch 75 to 95 per cent of the dust, only the finer particles would pass through to the filter bags. As a result, maximum suction would be maintained longer and the filter bags would not require cleaning as often.

The motorized Torit Separator is equipped with a ½ h.p., 3450 RPM end-mounted motor, fan and housing placed on top as shown in the illustration—a low-cost outfit for installation as indicated. The Torit Manufacturing Co., 296 Walnut St., St. Paul, Minn., will gladly send Bulletin No. 116 giving full details to all those who will address their requests on their firm letterhead.

Fluorescent "Controlenses"

The Holophane Co., 342 Madison Ave., New York, N. Y., is now manufacturing three prismatic glass lenses to be known as Fluorescent "Controlenses." The Controlenses, when used with fluorescent fixtures meeting the optical design specifications established by the Holophane Engineering Department, are said to produce three basic lighting distribution patterns.

The first lens, which is known as the Itensive Controlens, produces the distribution of light most commonly used in both commercial and industrial interiors—normal "uniform spacing" lighting of horizontal surfaces in rooms of normal height.

The second lens, the Concentrating Controlens, produces a rigidly confined focusing type of light distribution. This lens has several common applications, such as accent lighting, general illumination from great mounting heights, and "offset beam" lighting.

The third lens, which is designated as the Extensive Controlens, is particularly adaptable for areas where the lighting

"MAGIC" TACK RAGS
IMPROVE YOUR FINISH 100%

MAGIC TACK RAGS remove specks, lint and sand particles--- bring out that deep, smooth luster, produce a faultless surface for white or colored finish. Why use "home made" tack rags when you can buy MAGIC TACK RAGS at trifling cost! They are tackier, do not dry--- are dust-proof and spontaneous combustion proof. Packed in dozen and gross lots or more. Made only by the

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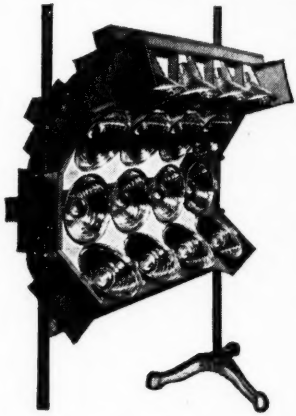
Toledo, Ohio, U. S. A.
If your dealer does not carry Magic Tack Rags, write us for sample.

of vertical surfaces is desired or in low ceiling areas to permit economical wide spacing of lighting units.

The fixtures used in connection with the Holophane Controlenses are for three types of installations; namely, recessed flush-with-the-ceiling, "close-up" to the ceiling, and for suspension mounting. The fixtures are designated as "Controlescent" fixtures.

Wilson "Patent-Flex" Infra-Drying Tunnels

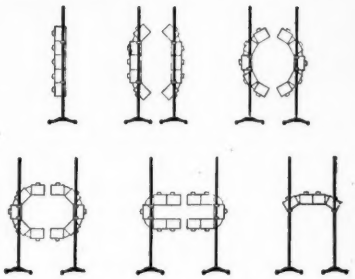
The Wilson "Patent-Flex" Universal Infra-Drying Tunnel, now being marketed by Wilson Lighting, Inc., 152 W. Erie St., Chicago, Ill., is said to be a vitally new, entirely different idea in construction and design, that combines the features of a permanent installation into a 100 per cent adjustable unit. The tunnels are available in a variety of sizes, and are instantly adjustable in



Wilson "Patent-Flex" Infra-Drying Tunnel

shape and height. The units can be used in "banks" or double "banks," or as completely enclosed tunnels.

The reflectors are focused for parallel



Arrangements Available for Wilson "Patent-Flex" Infra-Drying Tunnels

beam concentration so as to produce a very even heat pattern, and the unique design maintains uniform distances be-

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tween the reflector rows regardless of the shape given to the tunnel. The reflectors are made of permanent "Infra-Alzak" that has been proven to have a far greater over-all operating efficiency than gold plated reflectors which require frequent replating. The reflectors are mounted with interlocking brackets that assure complete stability, and the reflector is designed to give maximum reflectivity.

The Wilson Infra-Alzak reflector surfaces are easily cleaned and because of the homogenous character of the reflectors there is no thin plated surface to wear off, so that these reflectors will never require replating. The reflector strips are made with the Wilson patented Underwriters' Approved "snap-on" channels, wnich simplifies wiring and maintenance.

Behr-Manning Model 12-A Speed-Wet Sander

The illustration shows the Model 12-A Speed-Wet Sander now being marketed by Behr-Manning, Troy, N. Y. The sander is designed to fit the hand and may be used for dry sanding or with water, gasoline, or oil. The unit is constructed in such a manner as to hold a length of abrasive paper or cloth tightly in position over a replaceable Neoprene pad, and is recommended for sanding flat or slightly curved surfaces.

Behr-Manning Model 12-A Speed-Wet Sander

The Behr-Manning Speed-Wet Sander has a magazine in which a reserve supply of abrasive paper or cloth is rolled so that once the sander is loaded, the operator may continue sanding for a considerable length of time before reloading the back with an unused portion of abrasive material. When the sanding surface becomes unsuitable for further use, the operator pauses for a moment, unfastens a clamp, and pulls a new sanding surface into position, tearing off the worn out end. This operation is repeated when necessary until all reserve sandpaper in the magazine is used.

U. S. Vertical Explosion Proof Motor

U. S. Electrical Motors, Inc., 200 E. Slauson St., Los Angeles, Cal., is now marketing an explosion proof motor. The motor is suitable for vertical applications in both Class I, Group D and

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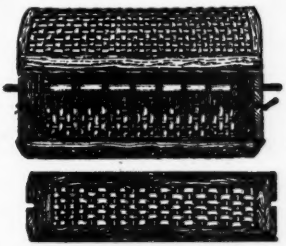

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Class II, Group G locations as defined by the National Board of Fire Underwriters. The first class are those locations in which flammable substances are present. The second class includes locations in which combustible dust is present.

The motor is fan-cooled and has asbestos protected windings, a feature which is especially important since U. S. Explosion Proof Motors are rated 55 deg. Centigrade rise or 37 per cent higher than U. S. Standard Motors. The vertical explosion proof motor is offered with a variety of mounting flanges. A mounting bracket is available to fit machines of any design without the use of additional adaptors or plates.

Wiegand Type C Air Heater

A convection heater, rated at 1,500 to 3,000 watts for operation on 115 or 230 volts, 60 cycle, a.c., and 115 or 230 volts d.c., to be known as the Type C has been placed on the market by Edwin L. Wiegand Company, 7500 Thomas Blvd., Pittsburgh, Pa. A curved baffle constructed inside the unit is said to efficiently discharge warm air generated by a Chromalox Finstrip heater element.

The Type C air heater is finished with two toggle switches, each controlling one-half the wattage, so that the heater may be operated at either half or full heat. The unit is finished in bronze crinkle lacquer and is equipped with floor mounting brackets.

Wiegand Type C Air Heater

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RUST INHIBITIVE

Formulated specifically for the following properties:

1. **Very fast air-drying**
2. **Water-whiteness**
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is used and recommended as a clear coating for hand tools, machine tools, hardware and wherever a clear protective coat for bright metal is required.

The Varnish Products Co.
5208 Harvard Ave. Cleveland, Ohio

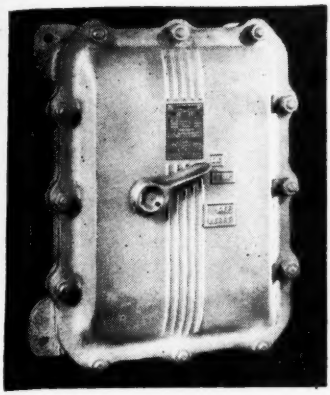
Westinghouse Circuit Interrupter for Hazardous Locations

For disconnecting or interrupting a.c. and d.c circuits in Class 1 Group D locations where atmospheres contain gasoline alcohols, natural gas and other explosive vapors, a new non-automatic circuit interrupter has been announced by Westinghouse Electric and Manufacturing Company, East Pittsburgh, Pennsylvania.

Manually operated, the De-ion circuit interrupter is furnished with a N.E.M.A. type 7 cast enclosure finished in aluminum with a closely ground fit between box and cover. Resistance to explosive pressures of hazardous atmospheres is assured by the heavy walls and strong fastenings.

Designed for 250 to 600 volts on a.c. circuits and 125 to 250 volts on d.c. circuits, the units are rated from 50 to 600 amperes depending on the frame sizes. Interrupting capacity is 5,000 to 10,000 amperes.

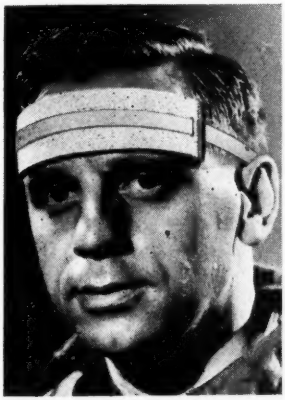
Contact burning is reduced to a minimum by De-ion arc quenchers which divide and extinguish arcs almost instantly. Silver or special silver composition with non-welding characteristics is used for all main contacts.



Westinghouse Circuit Interrupter for Hazardous Locations

A.O.C. Sweatband

A lightweight absorbent sweatband, made of synthetic sponge, has been announced by the American Optical Company, Southbridge, Mass. The sponge is 7½ in. long and covers a generous width of brow. The A.O.C. Sweatband can be sterilized and used again and again. It keeps sweat out of eyes and off goggles, thereby keeping vision clear so that workers on hot jobs won't get blindly in harm's way.



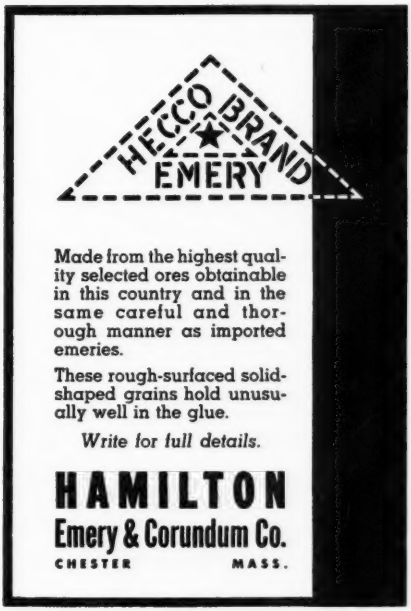
A.O.C. Sweatband

The manufacturer points out that needless loss of time spent by workmen in mopping goggles and foreheads can be eliminated with the protection given by a reliable, truly absorbent sweatband. Also, as comfort is increased by wearing a sweatband, fatigue lessens and workmen can do better, faster work.

Decade Capacitor

A choice of any capacity value from 0.01 to 11.1 mfd. in 0.01 mfd. steps, or other ranges, at the mere twist of three knobs, is provided by the Decade Capacitor Type DK offered by Industrial Instruments, Inc., 156 Culver Ave., Jersey City, N. J. The one per cent accuracy of the instrument makes it suitable for most laboratory as well as industrial applications, particularly for bridge measurements, filter design, and experimental tuned circuits.

The Decade Capacitor is housed in an attractive walnut cabinet with hinged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cover and snap lock. The etched metal panel has three knobs and dials calibrated directly in capacitance so that reading from left to right totals up the value available at the binding posts. Adjustments are made progressively in small uniform steps. All decades employ paper or mica dielectric capacitors of highest quality and stability. The instrument measures 7 x 8 x 5¾ in. and weighs 8 lbs. Three models are available: 11.1 total in 0.01 mfd. steps; 1.11 mfd. in 0.001 steps; and 1.11 in 0.001 steps with mica dielectric throughout.

Brown Pickling Tank Temperature Control System

The Brown Instrument Company, Wayne and Roberts Aves., Philadelphia, Pa., has placed on the market a temperature control system for pickling tanks which has been designed not only to overcome the difficulties arising from corrosive conditions in the pickling room but to lend itself to ease of manipulation as well as accuracy in operation.

According to the manufacturer, the greater uniformity of pickling which is an inherent characteristic of controlled picklers is only one of the many features observed in actual practice after the system has been installed. Because temperatures may be duplicated for long periods of time, the actual pickling which occurs may be held at an optimum level.

Other outstanding features of the Brown Pickling Tank Temperature Control System are said to be as follows: Shortening of pickling time because optimum pickling takes place at one certain temperature for each acid; saving materially on steam cost by avoiding high temperature following the heating up and during low load periods; saving of acid which is lost on high temperature evaporation; reduction of injuries to men and machinery; and reduction of discomfort to working personnel.

AMCO Brand "K"

A new metal coating compound, marketed under the name of AMCO Metallic Coating Powder, Brand "K" has been developed by the American Solder & Flux Co., Trenton Ave. and Norris St., Philadelphia, Pennsylvania.

This new product is designed for making repairs to damaged tin coatings. While the finished coating has the appearance of tin and matches perfectly with the surrounding hot dipped tin coating, it has an advantage not possessed by the original tin. AMCO Brand "K" Coatings are completely rust resistant and will protect the underlying iron or steel to the same extent as hot dipped zinc coating of the same thickness. This unusual and important property of the AMCO Brand "K" Coating is due to the fact that when in contact with iron or steel in a corrosive medium, it is electro-positive and therefore affords protection against rust and corrosion.

The material is intended for use wherever an original tin coating has been damaged in handling, worn away through use or burned away in a welding operation. Since the melting point of the Brand "K" is lower than that of tin, the original coating is not melted or disturbed in any way by the application. The coating on the repaired areas joins with the undamaged surrounding areas of tin, forming a continuous and protective surface.

Since the finished job looks the same as the tin, Brand "K" may be used wherever appearance is a factor. It is quite satisfactory for use on those surfaces of food containers which do not come into direct contact with the food itself. For all other forms of damaged tin coated equipment, it is the only product available which may be expected to make a satisfactory repair.

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Rust and Grease
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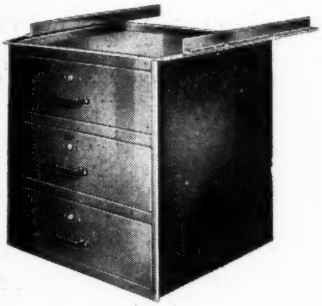
2160 Montcalm St., Indianapolis, Ind.

Lyon Drawer Units

Efficient individual storage of tools, records, and so on, of workers on two and three-shift operations is said to be possible by means of the two and three-drawer units now being marketed by Lyon Metal Products, Inc., 3074 Clark St., Aurora, Ill. The units may be furnished for use on workbenches, tool stands, shop desks, and under counters. Drawers feature easy sliding and flat key locks.



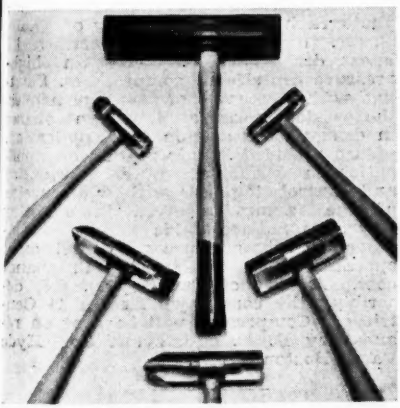
Lyon Three-Drawer Unit

Rapid Plastic Hammer

Plastic hammers, developed for use in metal working trades, tool and die shops and many industrial applications, were recently introduced by Rapid Manufacturing Company, Glendale, Calif. They are particularly adaptable for use in forming metal, since any metal or plated surface can be struck a full blow without being marred.

All but one of the "Rapid" hammers have replaceable tips of transparent amber "Pyralin," a DuPont Company cellulose nitrate plastic that is so tough it resists chipping or scratching. The handles are seasoned hickory, securely wedged and keyed in solid steel heads so they cannot twist or turn. Model No. 25 is made of laminated sheets of "Pyralin," with transverse laminations at the tips, and can be sawed into any desired shape.

Rapid plastic hammers range in weight from 3 ounces to 18 ounces, and are available in all standard peens.



Rapid Plastic Hammers

"Hallowell" Drawer Unit

A handy cabinet of drawers particularly adaptable for use in plants operating in several shifts has been added to the line of "Hallowell" shop equipment marketed by the Standard Pressed Steel Co., Box 556, Jenkintown, Pa. The cabinet is of sturdy steel construction and provides individual drawers for the

"Hallowell" Drawer Unit

safe keeping of tools and other equipment.

The cabinet can be made with any number of drawers, each of which is 20 x 20 x 6 in. in size, and is available with cylinder locks or provisions for padlocks. The drawer unit shown herewith is 52 in. high.

"What You Should Know About Shellac," is the title of a new scientific publication which has just been released by the Stewart Research Laboratory, 1340 New York Ave., N. W., Washington, D. C.

This is the first of an extensive series of "S.R.L." Research project reports. It is prepared in simplified form for paint and varnish dealers, home owners, floor refinishers, paint manufacturers and libraries. The report is mimeographed and nicely bound. There are 12 pages.

The authors of the article, Mr. J. R. Stewart and Mr. C. R. Cornthwaite, were previously associated with Dr. Henry A. Gardner, Director of the Scientific Section of the National Paint, Varnish and Lacquer Assn., Washington, D. C. At the present time, however, Mr. Stewart is connected with the Stewart Research Laboratory and Mr. Cornthwaite is a research associate at the National Bureau of Standards. The report is sold only with the understanding that the information will be kept confidential and not used for advertising or promotional purposes.

A copy of the publication is being mailed upon receipt of one dollar ($1.00).

Sturtevant Centrifugal Compressor Catalog. In a new 20-page catalog, profusely illustrated with installation photographs in a wide variety of plants, B. F. Sturtevant Co., describes its latest designs in large-column, high-pressure centrifugal compressors. Starting with a survey of basic principles, the catalog covers all important phases in design, construction and application.

Also included is information on application, methods of drive, lubrication and control, together with a discussion of the factors involved in effecting power economies, wide range of volumes at constant pressure, and quiet operation with minimum maintenance cost. A copy of Catalog No. 458, describing the company's Design 14 Centrifugal Compressor will be sent on request by B. F. Sturtevant Co., Hyde Park, Boston, Mass.

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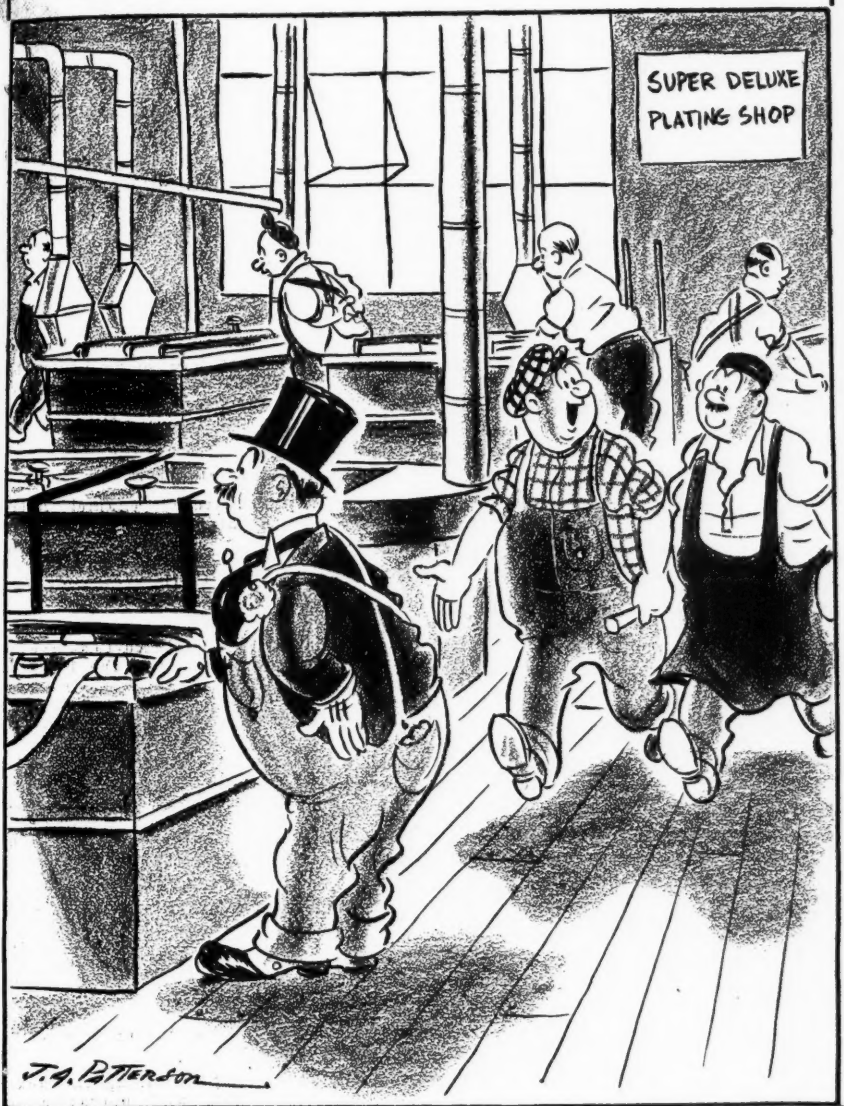
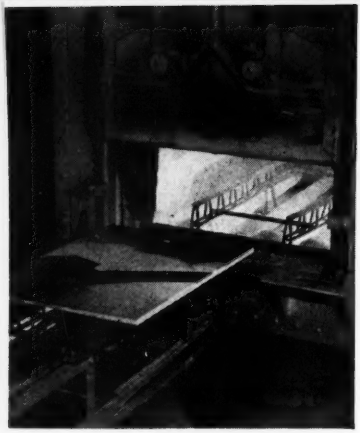
The Finishing Touch — **By J. A. Patterson**



"Frankly, I think Hopgood's promotion has went to his head."



FOR YOUR Catalog LIBRARY

To obtain copies of the catalogs listed here, indicate on the coupon the number of the item in which you are interested and mail as directed.

1. Fisher Electrophotometer

A modern instrument for colorimetric analysis is described in a bulletin now being issued by Fisher Scientific Company, 711 Forbes St., Pittsburgh, Pa.

2. Metal Cleaning Tips

The chemical classification and selection of alkaline metal cleaners is contained in a bulletin which has been prepared and is now being distributed by the Cowles Detergent Company, 7016 Euclid Ave., Cleveland, Ohio.

3. Airway Ventilated Buffs

Cool cutting buffs for high speed buffing operations are illustrated and described in a 4-page folder now being distributed by Jackson Buff Corporation, 20-03 41st Ave., Long Island City, New York.

4. Finishing Equipment Catalog

A very complete catalog illustrating and describing finishing equipment of all kinds is now being issued by Industrial Sheet Metal Works, 630 E. Forest Ave., Detroit, Michigan.

5. General Electric Immersion Heaters

Bulletin GEA-3195 now being issued by General Electric Company, Schenectady, N. Y., tells how to heat electroplating baths with General Electric Immersion Heaters.

6. Textured Enamel Finish

An improved textured enamel finish known as Rincontrol is fully illustrated and described in a folder now being issued by Roxalin Flexible Lacquer Co., Inc., Box 713, Elizabeth, New Jersey.

7. Ad-Lea-Sive

A description of what Ad-Lea-Sive is and how it can be used is the basis of information contained in a folder now being issued by The Lea Manufacturing Co., 22 Cherry St., Waterbury, Conn.

8. Dermaply Ointments

Ointments for treating industrial dermatitis are described in a folder now being issued by Nielco Chemical Company, 19720 Florence Rd., Detroit, Mich.

9. Du Pont High Speed Brass

The Electroplating Division of E. I. du Pont de Nemours & Company, Wilmington, Del., is now issuing a catalog describing an electroplating process for the rapid production of smooth, bright brass deposits.

10. GKS Truck Type Baking Ovens

A beautifully illustrated and informative 8-page catalog describing the flexibility, construction, and operation of truck type ovens is now being issued by George Koch Sons, Inc., 2112 Pennsylvania St., Evansville, Indiana.

11. Metal Conditioner and Cleaner

A corrosion solvent process designated as Corrosol No. 6 for use in protecting metal and prolonging life of paints is described in a folder now being issued by International Rustproof Corporation, 12307 Plover Ave., Cleveland, Ohio.

12. Heavy Duty Grinders and Buffers

The complete line of Marschke Heavy Duty Grinders and Buffers manufactured by Vonnegut Moulder Corporation, 1845 Madison Ave., Indianapolis, Ind., is illustrated and described in a 22-page catalog now being issued by the company.

13. Industrial Ovens

A 20-page catalog covering oven construction, method of heating, source of heat, and material handling is now being issued by J. O. Ross Engineering Corporation, 350 Madison Ave., New York City.

14. Hammond Variable Speed Lathe

A four-page folder illustrating and describing a method by which speed changes of 1,500 to 3,000 r.p.m. can be obtained instantly on the Hammond VRO Polishing and Buffing Lathe is now being issued by Hammond Machinery Builders, Inc., 1622 Douglas Ave., Kalamazoo, Michigan.

15. Penetrating Protective Paints

A completely illustrated six-page catalog on the subject of rust preventive oil paints is now being issued by The Wilbur & Williams Company, Park Square Bldg., Boston, Massachusetts.

16. Industrial Washing Machines and Conveyors

A folder telling how seven famous companies solved their product washing problems is now being issued by The Alvey - Ferguson Company, 75 Disney St., Cincinnati, Ohio.

17. Profits in Air

The manner in which electrostatic air filters help industrial plants eliminate losses resulting from contamination of products by dust, smoke, and fumes is described in a four-page folder which is now being issued by American Air Filter Co., Inc., 242 Central Ave., Louisville, Kentucky.

18. Clean Air

A folder telling how clean air is provided in America's blacked out factories is now being issued by American Air Filter Co., Inc., 254 Central Ave., Louisville, Kentucky.

19. Thiokol Facts

Thiokol Corporation, 780 N. Clinton St., Trenton, N. J., is now publishing a bulletin containing data on the uses of synthetic rubber in defense.

20. Facts About Towmotor

A complete catalog containing Towmotor operating data sheets is now being published by Towmotor Company, 1214 E. 152nd St., Cleveland, Ohio.

21. Chromium Chemicals

The discovery, development, and use of chromium chemicals are outlined in a 36 - page booklet entitled "Chromium Chemicals" which is now being issued by Mutual Chemical Company of America, 270 Madison Ave., New York City.

22. New Wrinkles in Finishing

Vol. 3, No. 3 of this publication contains 12 pages of pertinent information on the application of Wrinkle Finishes marketed by New Wrinkle, Inc., Mutual Home Bldg., Dayton, Ohio.

Print plainly in filling out coupon for literature.

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